

**APPROACHES TO DIGITAL LEARNING AND AUTHENTIC ASSESSMENT
IN ACCOUNTING EDUCATION**

by

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ABSTRACT

APPROACHES TO DIGITAL LEARNING AND AUTHENTIC ASSESSMENT IN ACCOUNTING EDUCATION

by

Cecile Janse van Rensburg

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This thesis reports on the use of various approaches to authentic assessment and learning, enabled by digital technologies, in an undergraduate competency-based accounting course, for the purpose of developing student competencies.

Research paper 1 documents the design and development of an authentic assessment for learning to develop students' digital creativity competence. The students' digital creative outputs and the students' experiences of developing these outputs were analysed. Despite the outputs primarily demonstrating a low level of digital creativity competence, the students were positive towards the assessment and suggested that they had gained deeper knowledge and understanding of the objective of financial reporting and appreciated the authenticity of the assessment.

Research paper 2 reports on the incorporation of Mobile Instant Messaging (MIM) in assessments to enable students to socially construct knowledge and develop their collaborative problem solving competence. The extent, timing and content of the MIM communications were influenced by the nature and stake of the assessment. The students' experiences of the use of MIM during assessments was positive. This was attributed to the learning opportunities, and collaboration and teamwork afforded by MIM. MIM further added assessment authenticity, accessibility and equitability. The description of the development and implementation of an Instant Messaging Assessment Tool (IMAT), to facilitate MIM

during assessments, can subsequently inform the development of similar assessments in other settings.

Research paper 3 reports on the use of an online social annotation platform (OSAP) to contribute towards developing students' reading comprehension of International Financial Reporting Standards (IFRS) in preparation for lifelong learning. The nature of the students' text-based interactions revealed high levels of collaboration with students asking and answering questions. The students' experiences of collaboratively reading and annotating study material using an OSAP, were positive. The use of an OSAP, in preparation for lifelong learning, enabled the students to collaborate and interact with their peers, motivated them to read their study material before class, and improved their comprehension of their study material.

In each instance, the digitally enabled authentic assessment for learning, that forms part of a programme of assessments, afforded the students opportunities to collaboratively construct their knowledge and develop a specific competence.

TABLE OF CONTENTS

DECLARATION	i
ABSTRACT	ii
LIST OF FIGURES	viii
LIST OF TABLES	ix
LIST OF ABBREVIATIONS	x
1 CHAPTER 1: INTRODUCTION	1
1.1 INTRODUCTION	1
1.2 RESEARCH AIM AND OBJECTIVE	4
1.3 SOCIAL CONSTRUCTIVISM	5
1.4 RESEARCH METHODOLOGY	8
1.5 THESIS STRUCURE	9
1.5.1 Developing digital creativity through authentic assessment (Chapter 2: Research paper 1)	10
1.5.2 Embracing mobile instant messaging during assessment (Chapter 3: Research paper 2)	11
1.5.3 An analysis of students' text-based interactions while collaboratively reading and annotating financial reporting standards (Chapter 4: Research paper 3)	12
1.6 SUMMARY	13
1.7 LIST OF REFERENCES	14
2 CHAPTER 2: DEVELOPING DIGITAL CREATIVITY THROUGH AUTHENTIC ASSESSMENT	28
2.1 INTRODUCTION	28
2.2 DIGITAL CREATIVITY IN ACCOUNTING	29
2.3 AUTHENTIC ASSESSMENT IN COMPETENCY-BASED ACCOUNTING EDUCATION	31
2.4 THE ASSESSMENT	32
2.4.1 Learning outcome	32
2.4.2 Design and development of the assessment	34

2.5	THE OUTPUTS	39
2.6	THE STUDENTS' EXPERIENCES	44
2.6.1	Survey approach	45
2.6.2	Analysis	45
2.6.3	Descriptive statistics	46
2.6.4	Qualitative analysis	47
2.7	CONCLUSION	51
2.8	LIST OF REFERENCES	53
3	CHAPTER 3: TALKING DURING A TEST?! EMBRACING MOBILE INSTANT MESSAGING DURING ASSESSMENT	62
3.1	INTRODUCTION	62
3.2	LITERATURE REVIEW	63
3.3	METHOD	65
3.3.1	Target population and teaching environment	65
3.3.2	Exploring students' MIM communications (RQ 1 and 2)	66
3.3.3	Data collection	67
3.3.4	Students' experiences (RQ 3)	68
3.4	RESULTS AND DISCUSSION	69
3.4.1	Exploring students' MIM communications (RQ 1 and 2)	69
3.4.1.1	Extent and timing (RQ 1)	69
3.4.1.2	Content (RQ 2)	72
3.4.2	Students' experiences (RQ 3)	73
3.4.2.1	Descriptive statistics	73
3.4.2.2	Qualitative analysis	75
3.5	CONCLUSION	76
3.6	LIST OF REFERENCES	79
3.7	APPENDIX A: INITIAL DEVELOPMENT AND POST IMPLEMENTATION REVIEW OF THE IMAT	86
3.7.1	Initial development	86
3.7.2	Post-implementation review	88

4	CHAPTER 4: AN ANALYSIS OF STUDENTS' TEXT-BASED INTERACTIONS WHILE COLLABORATIVELY READING AND ANNOTATING FINANCIAL REPORTING STANDARDS	92
4.1	INTRODUCTION	92
4.2	LITERATURE REVIEW	94
4.3	BACKGROUND	97
4.3.1	Target population and teaching environment	97
4.3.2	Selected OSAP	97
4.3.3	Written text	99
4.4	METHOD	100
4.4.1	Data collection	100
4.4.2	Nature of students' interactions (RQ 1)	101
4.4.3	Students' experiences (RQ 2)	102
4.4.3.1	Survey approach	102
4.4.3.2	Analysis	103
4.5	RESULTS AND DISCUSSION	104
4.5.1	Nature of students' interactions (RQ 1)	104
4.5.2	Students' experiences (RQ 2)	113
4.5.2.1	Descriptive statistics	113
4.5.2.2	Qualitative analysis	116
4.6	CONCLUSION	118
4.7	LIST OF REFERENCES	121
5	CHAPTER 5: CONCLUSION	132
5.1	INTRODUCTION	132
5.2	DEVELOPING DIGITAL CREATIVITY THROUGH AUTHENTIC ASSESSMENT (CHAPTER 2: RESEARCH PAPER 1)	134
5.3	EMBRACING MOBILE INSTANT MESSAGING DURING ASSESSMENT (CHAPTER 3: RESEARCH PAPER 2)	136

5.4	ANALYSIS OF STUDENTS' TEXT-BASED INTERACTIONS WHILE COLLABORATIVELY READING AND ANNOTATING FINANCIAL REPORTING STANDARDS (CHAPTER 4: RESEARCH PAPER 3)	137
5.5	SUMMARY	139
5.6	CONTRIBUTION	142
5.7	LIST OF REFERENCES	144
	COMBINED LIST OF REFERENCES	153

LIST OF FIGURES

Figure 2-1: The perception and reality of accounting	30
Figure 2-2: Paper-based versus digital financial reports	30
Figure 2-3: Extract from the reporting section of <i>The Coca-Cola Company</i> website	33
Figure 2-4: Exemplars	38
Figure 2-5: Presentation including hyperlinks and graphs at the modification level	41
Figure 2-6: Website explaining changes in cash flows in a creative manner	42
Figure 2-7: Video output at the modification level	42
Figure 2-8: Smartphone application at the redefinition level	43
Figure 2-9: Instagram output at the modification level	44
Figure 2-10: Instagram output at the redefinition level	44
Figure 3-1: Timing of student messages	71
Figure 3-2: <i>Bubble.io</i> development environment	87
Figure 3-3: <i>Bubble.io</i> database	87
Figure 3-4: IMAT user view on computer	88
Figure 3-5: IMAT user view on mobile device	88
Figure 3-6: Login message and notice under the “Write a message” text input box	89
Figure 3-7: Temporary capacity boost on <i>Bubble.io</i>	89
Figure 3-8: Conversation indicating sender’s first name	90
Figure 3-9: Auto scroll button	90
Figure 3-10: Instructor messages in different colours	91
Figure 4-1: Collaboration model	95
Figure 4-2: Upvoting function in <i>Perusall</i>	98
Figure 4-3: Principle-based standard	99
Figure 4-4: Arrows in the <i>Perusall</i> system indicating replies	101
Figure 4-5 Distribution of analysed annotations	106
Figure 4-6: Interaction provoked by student’s individual perspective	108
Figure 4-7: Disagreement displayed in an interactive conversation	109
Figure 4-8: Conversations developing from students asking questions	110
Figure 4-9: Examples given in reply to question asked	112
Figure 4-10: Frequencies of close ended survey questions	115

LIST OF TABLES

Table 2-1: Critical design elements of authentic assessment	34
Table 2-2: Summary of analysis of digital creative outputs	40
Table 2-3: Survey instrument questions	46
Table 2-4: Students' experiences of the authentic assessment	47
Table 3-1: Communicative activities with examples	66
Table 3-2: Students' use of MIM during assessments	70
Table 3-3: Frequencies of communicative activities	73
Table 3-4: Students' experiences of using MIM during assessments	74
Table 4-1: Survey instrument questions	103
Table 4-2: Descriptive analytics and annotation frequencies	105
Table 4-3: Types of information and resources shared	111
Table 4-4: Descriptive statistics – close ended survey questions	114

LIST OF ABBREVIATIONS

ACCA:	Association of Chartered Certified Accountants
CPA:	Certified Professional Accountants
CSCL:	Computer Supported Collaborative Learning
IASB:	International Accounting Standards Board
IFRS:	International Financial Reporting Standards
IMAT:	Instant Messaging Assessment Tool
IQR:	Inter-quartile Range
MIM:	Mobile Instant Messaging
MVP:	Minimum Viable Product
OECD:	Organisation for Economic Cooperation and Development
OSAP:	Online Social Annotation Platform
RQ:	Research Question
SAICA:	South African Institute of Chartered Accountants
SAMR:	Substitution Augmentation Modification Redefinition
TAIF:	Team Assessment with Immediate Feedback

1 CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

“...learning is active, not passive, learning is about ownership of skills, learning is for life...”

~ Watts 1991

Technological advances and the globalisation of the world's economies has led to the rapid evolution of the business environment (Bunney, Sharplin and Howitt 2015; Tan and Laswad 2018; Mustapha 2020). Over the past decade, this environment has increasingly become characterised by the rapid integration of information and communication technologies in all areas of life, including an accelerated move towards digitalisation, machine learning and artificial intelligence (Van Laar et al. 2017; Tan and Laswad 2018; Feintzeig 2020; Verwey 2022). The key drivers of this change has been the significant advances in computational ability and the rise of smart machines in an increasingly globally connected world. These changes necessitate ever increasing levels of adaptability and diversity by those who are to function successfully in this environment (Verwey 2022). The increasing automation of job tasks and the resultant decrease in the need for intensive human labour could result in high unemployment rates, particularly among graduates who have not yet adapted (Baygin et al. 2016; Tsiligiris and Bowyer 2021). The accounting profession is not immune to these changes and is expected to be significantly impacted by them. The adoption of digital technologies is expected to automate a substantial part of accounting tasks (Ghani and Muhammad 2019; Silva et al. 2020; Tsiligiris and Bowyer 2021). Consequently, professional accountants need to acquire a broader set of competencies than mere technical knowledge (Chaplin 2017; Winterton and Turner 2019; Jackson and Meek 2021). These competencies include collaboration, communication, digital literacy, citizenship, problem solving, critical thinking, creativity, and lifelong learning (Van Laar et al. 2017). Professional accounting education programmes must, therefore, enable their students to develop these competencies (Albrecht and Sack 2000; Bunney, Sharplin and Howitt 2015; Pathways Commission 2015; O'Connell et al. 2015; Ellington 2017; Nkhoma, Nkhoma and Tu 2018; Tan and Laswad 2018; Jackson and Meek 2021).

Competency-based education has been advocated as a means for professional education programmes to enable the development of future professional competence (Frank et al. 2010; Van der Vleuten 2015; Keshmiri et al. 2019; Matthew et al. 2020; Sistermans 2020). Competency-based education is an educational approach that focuses on students demonstrating mastery of specific skills and knowledge, rather than solely progressing through a curriculum based on seat-time or credit hours. In this model, students advance through the program based on their ability to demonstrate proficiency in defined competencies. The objective of competency-based accounting education, in particular, is to improve the education and training of future professional accountants so that they can provide reliable and high-quality accounting and related professional services (Lawson et al. 2014).

At the core of competency-based education are competency frameworks (Bolt-Lee and Foster 2003; Boritz and Carnaghan, 2003; Frank et al. 2010; Lawson et al. 2014; Harris et al. 2017) that identify the essential competencies necessary for success in a particular profession (Bolt-Lee and Foster 2003; Boritz and Carnaghan 2003; Abbasi 2013; Harris et al. 2017). The accounting profession has developed several competency frameworks for accounting education (see Certified Professional Accountants (CPA) Canada 2019; Association of Chartered Certified Accountants (ACCA) 2018; South African Institute of Chartered Accountants (SAICA) 2021). While it appears as if each professional accounting association has developed its own competency framework, it is submitted that there is much similarity in the content of these frameworks. This suggests a great deal of agreement across the world in terms of the competencies expected of a professional accountant. Many, if not all, of these frameworks require the development of competencies such as technical competence, problem solving, communication, collaboration, digital literacy, lifelong learning, and creativity and innovation (Partnership for 21st Century Skills 2015; Chhinzer and Russo 2018; World Economic Forum 2018; Deloitte 2019; Plant, Barac and Sarens 2019).

Despite its potential to enable the development of students' competencies, competency-based education has been subject to some criticism. For example, some competencies might be perceived as less observable and measurable than others which may limit their inclusion in the curriculum and assessment design (Malone and Supri 2012; Norman,

Norcini and Bordage 2014; Ten Cate and Billett 2014). This may be of particular concern where instructors resist the shift from asking, “What do students need to know?” or “How shall we teach learners?” to “What abilities are needed of graduates” (Frank et al. 2010). It is, therefore, necessary for instructors to ‘buy in’ to the change in mindset necessary to facilitate competency-based education. To encourage instructor ‘buy-in’, instructors should be supported by research in the area of competency-based education and provided with professional development opportunities, particularly those relating to teaching, learning and assessment methods suited to knowledge and competencies which are not easily observable and measurable (Schmulian 2018).

Given that competency-based education shifts the focus of education from transmitting isolated knowledge at particular points in time to focusing on student-centred learning and the development of competencies over time (Baartman et al. 2007), assessment must expand beyond the traditional and reductionist psychometric measurement and validation of individual students’ learning (Boud 1990; Mustapha 2020; Schuwirth and Van der Vleuten 2020). Competency-based education requires a more authentic, robust and holistic, ‘programmatic approach to assessment’ informed by several data points over time (Harris et al. 2017; Schuwirth and Van der Vleuten 2011). Authentic ‘assessments for learning’ that enable the development of competencies over time, supported by effective feedback, contribute to the data points needed by competency-based education (Schuwirth and Van der Vleuten 2011; Ashford-Rowe, Herrington and Brown 2014; Van der Vleuten 2015; Siddiq, Gochyyev and Wilson 2017; Broadbent, Panadero and Boud 2018; Villarroel et al. 2020).

For an assessment to be authentic, it should in some way reflect the practice of the profession being assessed (Hart et al. 2011; Kearney 2013; Jopp 2020) through the use of work-related practical problems, challenges and complexities that are likely to be encountered in the work environment (Gulikers, Bastiaens and Kirschner 2006; Gulikers et al. 2008; Adie, Hee and Wharton 2010; Maxwell 2012; Villarroel et al. 2020). Given the extensive digital integration and technological advances of modern business environments, the use of technology can assist in providing these authentic contexts (McLoughlin and Luca 2002; Bozalek, Ng’ambi and Gachago 2013; Jopp 2020; Butler-Henderson and Crawford 2020; Nieminen, Bearman and Ajjawi 2022) and support more equitable and creative

methods of assessment (Timmis et al. 2016; Ibarra-Sáiz et al. 2020). The use of digital technology to support learning, or digital learning, can also enhance student engagement, interactivity, and learning (Ahmed and Parsons 2013; Jopp 2020; Butler-Henderson and Crawford 2020; Voshaar et al. 2022). A few examples of technology that can be incorporated in an authentic learning and assessment environment include online multimedia information; asynchronous and synchronous communication tools; online communication platforms; social networking tools and mobile devices (Saxena 2013). The three approaches to digital learning and authentic assessment explored in this thesis provide further examples of how digital technology can be incorporated in the design and development of authentic assessments, specifically in the domain of accounting education.

1.2 RESEARCH AIM AND OBJECTIVE

Despite accounting education's transition to competency-based education (Abbasi 2013; Borgonovo, Friedrich and Wells 2019), it is submitted that assessment in accounting education continues to be characterised by high stakes assessments of learning for certification purposes rather than competency-based assessments for learning (Wilson 2011; Coetzee and Schmulian 2012; Venter and De Villiers 2013). In response, this thesis aims to contribute to existing literature by reporting on various approaches to authentic assessment and learning, enabled by digital technology, in an undergraduate competency-based accounting course, with the objective to promote collaborative student-centred learning and the development of student competencies.

It is not practical to simultaneously address all the essential competencies within the confines of a university (Wilson 2011). Accounting instructors, therefore, need to prioritise certain competencies for development across the broader education programme, their course, and specific assessments (Tan and Laswad 2018). Therefore, the instructor team of the targeted accounting course, in agreement with the programme co-ordinator, prioritised the development of *digital creativity*, *collaborative problem solving* and *lifelong learning* as the essential competencies during the course, as part of the broader education programme. The decision to prioritise these competencies was informed through a process of aligning the curriculum requirements and goals of the department, university and professional association governing the target populations' qualification as professional accountants.

In particular, this thesis, reports on:

1. The use, design and development of an authentic assessment for learning to develop students' *digital creativity* competence (Chapter 2: Research paper 1).
2. The use of Mobile Instant Messaging (MIM) in assessments, to enable students to socially construct knowledge and develop their *collaborative problem solving* competence, while being assessed individually (Chapter 3: Research paper 2).
3. The use of an online social annotation platform (OSAP) as a computer supported collaborative learning (CSCL) tool to contribute towards developing students' reading comprehension and their *lifelong learning* competence (Chapter 4: Research paper 3).

1.3 SOCIAL CONSTRUCTIVISM

The philosophy of social constructivism is an important enabling learning theory (Vygotsky 1978; Nkhoma, Nkhoma and Tu 2018) in competency-based education (Schmullian and Coetzee 2019). According to social constructivist theory (Vygotsky 1978), learning environments that encourage interaction, active participation, and dialogue afford students with opportunities to engage in a process of knowledge construction as they attempt to create meaning from new experiences (Jonassen et al. 1995; Pena-Shaff and Nicholls 2004; Falkner and Falkner 2012). Learning is more effective when students are able to discuss with their peers their ideas, experiences and perceptions. This is not a passive process but requires active participation and interaction with the environment as well as with others (Jonassen et al. 1995; Pena-Shaff and Nicholls 2004). Prior research demonstrates the educational benefit of student engagement in active and collaborative learning activities (Pena-Shaff and Nicholls 2004; Falkner and Falkner 2012; Freeman et al. 2014; Kay, Hardy and Galloway 2020), focussing on the idea that the student needs to be at the centre of their own learning experience while engaging more meaningful with course content (Kay, Hardy and Galloway 2020). In this manner, learning becomes an active process in which students create meaning by analysing, discussing and experiencing new situations and applying new concepts (Pena-Shaff and Nicholls 2004; Falkner and Falkner 2012).

Social constructivist theory further requires that learning should be authentic (Brown, Collins and Duguid 1989; Woo and Reeves 2007). Allowing students to collaborate around

authentic tasks not only improves their understanding of the concepts under discussion but also clarifies how these concepts extrapolate to their future world of work (Woo and Reeves 2007). Consequently, learning needs to meet real-life experiences, as students want to develop competencies related to their real-life future work encounters (Huang, Rauch and Liaw 2010; Vos 2015; Farrell 2020). Social constructivist learning environments should, therefore, provide real-world, case-based environments in which meaningful and authentic knowledge can be constructed (Huang, Rauch and Liaw 2010). The use of digital technologies can be effective in developing student competencies within a social constructivist learning environment (Arquero and Romero-Frías 2013; Jopp 2019). Digital technology creates opportunities for students to work collaboratively, to enhance and develop their communication and interpersonal skills and makes sharing of knowledge and information possible (Arquero and Romero-Frías 2013). The use of digital technology for educational purposes, therefore, fits well with the requirements of a social constructivist approach to education.

Professional accounting education programmes have often been criticised for their narrow focus and overemphasis on technical knowledge (Bayerlein 2015) together with their failure to develop broader competencies in their students (McGowan 2012; Douglas and Gammie 2019; Jackson and Meek 2021). The enduring technical focus of traditional accounting education programmes is aligned with students' and society's traditional stereotype perceptions of accountants as technical experts (Andon, Ming and Roebuck 2010). Professional accounting education programmes are also often criticised for their reliance on rote-style learning rather than contextualised student-centred learning (Bayerlein 2015). A possible solution to the highlighted criticisms is the application of collaborative student-centred teaching and learning approaches (Stanley and Marsden 2012; Bayerlein 2015) that embrace the principles of social constructivism. Student-centred learning is characterised by innovative methods of teaching and assessment that involve students as active participants in their own learning (Mustapha 2020). Furthermore, the collaborative, interactive and practical nature of the accounting content resonates well with the pedagogical imperatives of social constructivism and is well-matched with the assumptions of social constructivism (Silva 2018; Sithole and Pereira 2019; Mapuya 2021). As such, social constructivism finds relevance and applicability in accounting education (Silva 2018; Sithole and Pereira 2019; Mapuya 2021).

Consequently, social constructivism is adopted as the underlying theory of this thesis. It is applied in the research of various approaches to digital learning and authentic assessment in a competency-based accounting education environment. In particular, it is applied as follows in each of the three research papers presented in this thesis:

1. Research paper 1 (Chapter 2):

The authentic team assessment designed and developed in this research paper places the emphasis on authentic interactions and teamwork and creates an opportunity for students to collaborate and socially construct their knowledge. Guided by one of the design elements of an authentic assessment, which requires an element of collaboration, the students are clustered into teams and have to generate a single digital creative output as a team. In these teams the students have the opportunity to share their ideas, experiences and perceptions while working towards a shared goal.

2. Research paper 2 (Chapter 3):

The authentic team assessment implemented in this research paper applies digital technology, in the form of MIM, to create opportunities for students to work collaboratively and socially construct their knowledge. The use of MIM enables students to communicate with other students while being assessed individually. This interaction encourages active participation, interaction and dialogue and places the students at the centre of their own learning experiences. Students are afforded an opportunity to construct their own knowledge by sharing their own perceptions and being exposed to the perceptions of others.

3. Research paper 3 (Chapter 4):

The authentic team assessment executed in this research paper applies digital technology, in the form of an OSAP, to create opportunities for students to work collaboratively and socially construct their knowledge. The use of an OSAP enables students to collaboratively read and annotate the content of a financial reporting standard as preparation for in-class activities. The use of an OSAP puts the students at the centre

of their own learning experience while enabling them to engage more meaningfully with course content. This interaction allows students to articulate their own individual perspectives while also accommodating the perspectives of others in the process of working towards a shared understanding of the course content.

1.4 RESEARCH METHODOLOGY

Research within a social constructivist learning environment seeks to understand the inner meaning of particular situations or phenomena (Denicolo 2016). It is often highly beneficial in such research to elicit qualitative rather than quantitative data. However, greatest value might be gained through mixed methods, involving different paradigms or mixed techniques (Denicolo 2016).

In this thesis, a mixed-method data collection approach is, therefore, used to quantitatively and qualitatively source data from student work, student interaction and engagement, and student reflections. To obtain an accurate view of the social constructivist learning experiences of the students, it is necessary to provide the students with an opportunity to reflect on their experiences of each of the authentic assessments as active and responsible stakeholders in the assessment process (Boud 1990). Data is, therefore, collected through the analysis of the students' work and live interactions and the implementation of multiple student surveys to capture the students' reflections. Content analysis and qualitative coding are used to analyse the resultant data.

This research methodology is applied as follows in each of the three research papers presented in this thesis:

1. Research paper 1 (Chapter 2):

Data is collected in the form of student work comprising the student teams' digital creative outputs. These outputs are analysed and categorised with reference to the creativity and digital functionality displayed. In addition to analysing the student teams' digital creative outputs, quantitative and open-ended qualitative data are collected

through a survey instrument in an attempt to understand more about the students' experiences of the assessment.

2. Research paper 2 (Chapter 3):

Data is collected from the students' interactive online engagement in the form of transcripts of the messages sent by the students while using MIM during assessments. The extent and timing of the students' use of MIM as well as the communicative activities evident in the content of the students' MIM communications are analysed. Quantitative and open-ended qualitative data are generated through an online student survey to explore the students' experiences of being able to use MIM during assessments.

3. Research paper 3 (Chapter 4):

Data is collected from the students' interactive online engagement in the form of transcripts of the student annotations while collaboratively reading and annotating a financial reporting standard using an OSAP. The nature of the students' text-based interactions is analysed with reference to different stages of interaction and collaboration. Quantitative and open-ended qualitative data are generated through a student survey relating to the students' experiences of using the OSAP. Insights into the students' experiences may illuminate the nature of their interactions.

1.5 THESIS STRUCURE

This thesis is presented in the form of three research papers, each focusing on the development of one of these prioritised competencies. All three research papers are rooted in social constructivism and incorporate a collaborative learning element. Each research paper further documents the design and development and/or implementation of an authentic assessment or learning intervention that is enabled by digital technology. In each of the three research papers, data is collected from the analysis of the students' work or live interactions and from student surveys, following a mixed-methods research methodology.

1.5.1 Developing digital creativity through authentic assessment (Chapter 2: Research paper 1)

Digital creativity, or the use of digital tools and technologies to explore creative ideas and new ways of displaying ideas, research, or work, is emerging as an important competence for graduates across many disciplines (Lee and Chen 2015; University of York 2019). The development of digital creativity competence in domains traditionally perceived as being less creative, including the accounting profession, has yet to be explored. Accountants communicate useful data and information to users thereof in the form of a company's financial report (Deegan and Unerman 2006). While these financial reports have traditionally been paper-based and presented in black and white, digital technology has opened up new ways of communicating this data and information for decision making, and creates new opportunities for presenting and comparing additional data and information in ways not previously possible. Although accounting practice has progressed towards embracing the possibilities afforded by the use of digital technologies to present financial reports in digitally creative ways, accounting education has not yet followed suit and are still primarily focusing on more traditional paper-based financial reports as opposed to more digital creative outputs. It is submitted that the development of students' digital creativity in accounting courses, which are not conventionally perceived as creative (McGowan 2012; Rossetto and Chapple 2019), is possible through the design, development and facilitation of an authentic collaborative assessment for learning in a competency-based accounting course. The authenticity element of the assessment attempts to close the gap between accounting practice and accounting education by creating an opportunity for accounting students to collaboratively research and present financial information of a real-world company in a creative manner by using available digital technologies. The detailed description of the design of the authentic assessment can subsequently inform the development of similar assessments in other settings. Analysis of the students' digital creative outputs, as well as understanding more about the students' experiences of the assessment, may improve the process of enabling accounting students to develop their digital creativity.

1.5.2 Embracing mobile instant messaging during assessment (Chapter 3: Research paper 2)

Collaborative problem solving, or the ability to solve problems through interacting with a group of individuals, is a competence that is widely sought after by employers (Organisation for Economic Cooperation and Development (OECD) 2017; Fiore, Graesser and Greiff 2018; Mehrabi Boshrabadi and Hosseini 2021). The calls for assessment programmes, to incorporate elements of assessments for learning and the development of competencies (Schuwirth and Van der Vleuten 2011; Van der Vleuten 2015; Broadbent, Panadero and Boud 2018), together with the focus on collaborative learning activities, has drawn attention to the potential of incorporating these activities into assessments (Rieger and Heiner 2014; Jang et al. 2017). In real-life contexts, professionals work in teams in which they share and apply knowledge and revise and adjust their knowledge through discussion, application and enquiry (McCloughlin and Luca 2002; Conde et al. 2020). Accounting graduates are also expected to work in teams when entering the accounting profession (Albrecht et al. 1994; Low, Samkin and Liu 2013; Keevy 2015). In these teams, they will be required to "exchange ideas, express opinions, solve problems and resolve differences in a timely and proper manner" with colleagues and clients (Stovall and Stovall 2009,102 in Keevy 2015). In the rapidly changing work environment, working remotely and engaging in collaborative problem solving through the use of mobile technologies, such as Mobile Instant Messaging (MIM) is common (Castrillon 2020; Choudhury 2020). Therefore, to authentically reflect the practice of the discipline being assessed, and to facilitate collaborative learning, it is submitted that students should be enabled to collaborate while solving a problem during assessments, using mobile technologies such as MIM. The use of MIM by students for collaborative learning and problem solving while being assessed individually, has yet to be explored. Digital learning, through the use of information technologies, has presented promising results in higher education by enhancing student engagement and learning success (Ahmed and Parsons 2013; Bozalek, Ng'ambi and Gachago 2013; Jopp 2019; Butler-Henderson and Crawford 2020; Voshaar et al. 2022). Information technologies are closely associated with the quality of the learning experience, and can be used to create authentic contexts for learning and authentic assessment tasks (Shaffer and Resnick 1999; McLoughlin and Luca 2002; Bozalek, Ng'ambi and Gachago 2013; Jopp 2019; Butler-Henderson and Crawford 2020). Incorporating technology-enhanced authentic assessments could include the

development of new tools that reflect innovative pedagogical principles by employing technologies that support more equitable and creative methods of assessment (Timmis et al. 2016; Ibarra-Sáiz et al. 2020). The development and implementation of a dedicated Instant Messaging Assessment Tool (IMAT) could, therefore, enable the analysis of the students' MIM communications and serve as a source of diagnostic information of the students' learning. The detailed description of the development and implementation of the IMAT as well as an open-access template of the IMAT can subsequently inform the development of similar assessments in other disciplinary settings. Students' experiences of being able to use MIM during their assessments are important, as the students are active and responsible stakeholders in the assessment process.

1.5.3 An analysis of students' text-based interactions while collaboratively reading and annotating financial reporting standards (Chapter 4: Research paper 3)

Knowledge of financial reporting standards, that inform the preparation of financial statements, represent a significant component of a professional accountant's required technical competence (Wilburn and Kilpatrick 2020; South African Institute of Chartered Accountants (SAICA) 2021). These financial reporting standards are dynamic and subject to substantial revision over time (Hilton and Johnstone 2013; International Financial Reporting Standards (IFRS) Foundation 2021). To be able to learn and relearn as part of lifelong learning, professional accountants must be able to read, with comprehension, the written language contained in these standards, during their studies and throughout their careers (McGowan 2012; Janse van Rensburg, Coetzee and Schmulian 2014; Baker 2019). The ability to read written language, with comprehension, for lifelong learning, can be developed by engaging students in collaborative reading (Johnson, Archibald and Tenenbaum 2010; Chen, Li and Chen 2020) using an online social annotation platform (OSAP) (Novak et al. 2012; Gao 2013; Ghadirian, Salehi and Ayub 2018; Zhu et al. 2020). The nature of students' text-based interactions and level of collaboration when using an OSAP is important to determine if the students' use of an OSAP is conducive to promoting the students' ability to read study material with comprehension (Northrup 2001; Kreijns, Kirschner and Jochems 2003; Murphy 2004; Gao 2013; Adams and Wilson 2020).

Understanding how accounting students behave and interact while collaboratively reading and annotating a technical document, such as financial reporting standards, using an OSAP, in a large class, has yet to be explored. Insights into the students' experiences of using an OSAP, while collaboratively reading and annotating a financial reporting standard, with limited to no instructor intervention, may provide a deeper understanding of factors underlying the nature of the students' interactions.

1.6 SUMMARY

This thesis reports on various approaches to digital learning and authentic assessment in accounting education with the purpose of developing selected competencies. In particular, this thesis reports on the design and development of an authentic assessment to develop students' *digital creativity* competence (Research paper 1); the incorporation of MIM in assessments to enable students to develop their *collaborative problem solving* competence (Research paper 2); and the use of an OSAP to contribute towards students' reading comprehension and their *lifelong learning* competence (Research Paper 3). This thesis is submitted in the form of three research papers (Chapters 2 – 4), each with its own reference list. Thereafter the thesis is concluded (Chapter 5). A combined reference list is presented at the end of the thesis.

1.7 LIST OF REFERENCES

- Abbasi, N. 2013. "Competency Approach to Accounting Education: A global view." *Journal of Finance and Accountancy* 13 (1): 1–18.
- Adams, B., and N. S. Wilson. 2020. "Building Community in Asynchronous Online Higher Education Courses Through Collaborative Annotation." *Journal of Educational Technology Systems* 49 (2): 250–261.
- Adie, L. E., L. Hee, and L. Wharton. 2010. "Incorporating Authentic Assessment into Different University Learning Scenarios." In: *Emerging Trends in Higher Education Learning and Teaching: Proceedings of the TARC International Conference on Learning and Teaching* (pp. 82–90). Tunku Abdul Rahman College.
- Ahmed, S., and D. Parsons. 2013. "Abductive Science Inquiry Using Mobile Devices in the Classroom." *Computers & Education* 63: 62–72.
- Albrecht, W. S., D. C. Clark, J. M. Smith, K. D. Stocks, and L. W. Woodfield. 1994. "An Accounting Curriculum for the Next Century." *Issues in Accounting Education* 9 (2): 401–425.
- Albrecht, W., and R. Sack. 2000. *Accounting education: Charting the course through a perilous future*. Accounting Education Series, Vol. No. 16. Sarasota: American Accounting Association, Florida
- Andon, P., C. K. Ming, and P. Roebuck. 2010. "Personality Preferences of Accounting and Non-Accounting Graduates Seeking to Enter the Accounting Profession." *Critical Perspectives on Accounting* 21 (4): 253–265.
- Arquero, J. L., and E. Romero-Frías. 2013. "Using Social Network Sites in Higher Education: An Experience in Business Studies." *Innovations in Education and Teaching International* 50 (3): 238–249.

Ashford-Rowe, K., J. Herrington, and C. Brown. 2014. "Establishing the Critical Elements that Determine Authentic Assessment." *Assessment & Evaluation in Higher Education* 39 (2): 205–222.

Association of Chartered Certified Accountants (ACCA). 2018. "ACCA Career Navigator." Accessed 9 September 2022. <https://careernavigator.accaglobal.com/gb/en.html>

Baartman, L. K., T. J. Bastiaens, P. A. Kirschner, and C. P. Van der Vleuten. 2007. "Evaluating Assessment Quality in Competence-Based Education: A Qualitative Comparison of Two Frameworks." *Educational Research Review* 2 (2): 114–129.

Baker, P. 2019. "An Experiment Using Two Methods of Teaching Accounting for Leases in Intermediate Accounting." *The Journal of Applied Business and Economics* 21 (6): 25–31.

Bayerlein, L. 2015. "Curriculum Innovation in Undergraduate Accounting Degree Programmes through 'Virtual Internships'." *Education + Training* 57 (6): 673–684.

Baygin, M., H. Yetis, M. Karakose, and E. Akin. 2016. "An Effect Analysis of Industry 4.0 to Higher Education." *15th International Conference on Information Technology Based Higher Education and Training (ITHET)* 1–4.

Bolt-Lee, C., and S. Foster. 2003. "The Core Competency Framework: A New Element in the Continuing Call for Accounting Education Change in the United States." *Accounting Education* 12 (1): 33–47.

Boritz, J. E., C. A. Carnaghan. 2003. "Competency-Based Education and Assessment for the Accounting Profession: A Critical Review." *Canadian Accounting Perspectives* 2 (1): 7–42.

Boud, D. 1990. "Assessment and the Promotion of Academic Values." *Studies in Higher Education* 15 (1): 101–111.

Borgonovo, A., B. Friedrich, and M. Wells. 2019. "Competency-Based Accounting Education, Training, and Certification: An Implementation Guide." The World Bank.

Bozalek, V., D. Ng'ambi, and D. Gachago. 2013. "Transforming Teaching with Emerging Technologies: Implications for Higher Education Institutions." *South African Journal of Higher Education* 27 (2): 419–436.

Broadbent, J., E. Panadero, and D. Boud. 2018. "Implementing Summative Assessment with a Formative Flavour: A Case Study in a Large Class." *Assessment & Evaluation in Higher Education* 43 (2): 307–322.

Brown, J. S., A. Collins, and P. Duguid. 1989. "Situated Cognition and the Culture of Learning." 1989 18 (1): 32–42.

Bunney, D., E. Sharplin, and C. Howitt. 2015. "Generic Skills for Graduate Accountants: The Bigger Picture, a Social and Economic Imperative in the New Knowledge Economy." *Higher Education Research & Development* 34 (2): 256–269.

Butler-Henderson, K., and J. Crawford. 2020. "A Systematic Review of Online Examinations: A Pedagogical Innovation for Scalable Authentication and Integrity." *Computers & Education*: 104024.

Castrillon, C. 2020. "This is the Future of Remote Work in 2021." *Forbes*, December 27. Accessed 29 November 2021. <https://bit.ly/3xfZmoz>

Certified Professional Accountants (CPA) Canada. 2019. "The CPA Competency Map." Accessed 8 September 2022. <https://www.cpacanada.ca/-/media/site/become-a-cpa/docs/competencymap.pdf>

Chaplin, S. 2017. "Accounting Education and the Prerequisite Skills of Accounting Graduates: are Accounting Firms Moving the Boundaries?." *Australian Accounting Review* 27 (1): 61–70.

Chen, C. M., M. C. Li and T. C. Chen. 2020. "A Web-Based Collaborative Reading Annotation System with Gamification Mechanisms to Improve Reading Performance." *Computers & Education* 144: 103697.

Chhinzer, N., and A. Russo. 2018. "An Exploration of Employer Perceptions of Graduate Student Employability." *Education + Training* 60 (1): 104–120.

Choudhury, P. 2020. "Our Work-From-Anywhere-Future." *Business Harvard Review*, November-December 2020. Accessed November 29 2021. <https://hbr.org/2020/11/our-work-from-anywhere-future>

Coetzee, S. A., and A. Schmulian. 2012. "A Critical Analysis of the Pedagogical Approach Employed in an Introductory Course to IFRS." *Issues in Accounting Education* 27 (1): 83–100.

Conde, M. Á., F. J. Rodríguez-Sedano, F. J. Rodríguez-Lera, A. Gutiérrez-Fernández, and Á. M. Guerrero-Higueras. 2020. "Assessing the Individual Acquisition of Teamwork Competence by Exploring Students' Instant Messaging Tools Use: the WhatsApp Case Study." *Universal Access in the Information Society*: 1–10.

Deegan, C., and J. Unerman. 2006. *Financial Accounting Theory: European Edition*. McGraw-Hill.

Deloitte. 2019. "The Path to Prosperity: Why the Future of Work is Human."

Denicolo, P. 2016. "Constructivist Approaches and Research Methods: A Practical Guide to Exploring Personal Meanings. SAGE. Accessed 4 February 2023. <https://methods.sagepub.com/book/constructivist-approaches-and-research-methods>

Douglas, S., and E. Gammie. 2019. "An Investigation into the Development of Non-Technical Skills by Undergraduate Accounting Programmes." *Accounting Education* 28 (3): 304–332.

Ellington, P. 2017. "The Impediments to the Change to UK University Accounting Education, a Comparison to the USA Pathways Commission." *Accounting Education* 26 (5–6): 576–598.

Falkner, K., and N. J. Falkner. 2012. "Supporting and Structuring 'Contributing Student Pedagogy' in Computer Science Curricula." *Computer Science Education* 22 (4): 413–443.

Farrell, C. 2020. "Do International Marketing Simulations Provide an Authentic Assessment of Learning? A Student Perspective." *The International Journal of Management Education* 18 (1): 100362.

Feintzeig, R. 2020. "The Vanishing Executive Assistant." *The Wall Street Journal*. Accessed 5 March 2021. <https://www.wsj.com/articles/the-vanishing-executive-assistant-11579323605>

Fiore, S. M., A. Graesser, and S. Greiff. 2018. "Collaborative Problem-Solving Education for the Twenty-First-Century Workforce." *Nature Human Behaviour* 2 (6): 367–369.

Frank, J. R., L. S. Snell, O. T. Cate, E. S. Holmboe, C. Carraccio, S. R. Swing, P. Harris, N. J. Glasgow, C. Campbell, D. Dath, and R. M. Harden. 2010. "Competency-Based Medical Education: Theory to Practice." *Medical Teacher* 32 (8): 638–645.

Freeman, S., S. L. Eddy, M. McDonough, M. K. Smith, N. Okoroafor, H. Jordt, and M. P. Wenderoth. 2014. "Active Learning Increases Student Performance in Science, Engineering, and Mathematics." *Proceedings of the National Academy of Sciences*. 111 (23): 8410–8415.

Gao, F. 2013. "A Case Study of Using a Social Annotation Tool to Support Collaboratively Learning." *The Internet and Higher Education* 17: 76–83.

Ghadirian, H., K. Salehi, and A. F. M. Ayub. 2018. "Social Annotation Tools in Higher Education: A Preliminary Systematic Review." *International Journal of Learning Technology* 13 (2): 130–162.

Ghani, E. K., and K. Muhammad. 2019. "Industry 4.0: Employers' Expectations of Accounting Graduates and Its Implications on Teaching and Learning Practices." *International Journal of Education and Practice* 7 (1): 19–29.

Gulikers, J. T., T. J. Bastiaens, and P. A. Kirschner. 2006. "Authentic Assessment, Student and Teacher Perceptions: The Practical Value of the Five-Dimensional Framework." *Journal of Vocational Education and Training* 58 (3): 337–357.

Gulikers, J. T., L. Kester, P. A. Kirschner, and T. J. Bastiaens. 2008. "The Effect of Practical Experience on Perceptions of Assessment Authenticity, Study Approach, and Learning Outcomes." *Learning and Instruction* 18 (2): 172–186.

Harris, P., F. Bhanji, M. Topps, S. Ross, S. Lieberman, J. R. Frank, ... and ICBME Collaborators. 2017. "Evolving Concepts of Assessment in a Competency-Based World." *Medical Teacher* 39 (6): 603–608.

Hart, C., S. Hammer, P. Collins, and T. Chardon. 2011. "The Real Deal: Using Authentic Assessment to Promote Student Engagement in the First and Second Years of a Regional law Program." *Legal Education Review* 21: 97–121.

Hilton, S. R., and N. Johnstone. 2013. "The IFRS Transition and Accounting Education: A Canadian Perspective Post-Transition." *Issues in Accounting Education* 28 (2): 253–261.

Huang, H. M., U. Rauch, and S. S. Liaw. 2010. "Investigating Learners' Attitudes Toward Virtual Reality Learning Environments: Based on a Constructivist Approach." *Computers & Education* 55 (3): 1171–1182.

Ibarra Sáiz, M. S., G. Rodríguez Gómez, D. Boud, T. Rotsaert, S. Brown, M. L. Salinas, and H. M. Rodríguez Gómez. (2020). "The Future of Assessment in Higher Education." *Relieve* 26 (1).

International Financial Reporting Standards (IFRS) Foundation. 2021. "IFRS Foundation Work Plan." Accessed 9 September 2022. <https://www.ifrs.org/projects/work-plan/>

Jackson, D., and S Meek. 2021. "Embedding Work-Integrated Learning into Accounting Education: The State of Play and Pathways to Future Implementation." *Accounting Education* 30 (1): 63–85.

Jang, H., N. Lasry, K. Miller, and E. Mazur. 2017. "Collaborative Exams: Cheating? Or Learning?" *American Journal of Physics* 85 (3): 223–227.

Janse van Rensburg, C., S. A. Coetzee, and A. Schmulian. 2014. "South African Financial Reporting Students' Reading Comprehension of the IASB Conceptual Framework." *Journal of Accounting Education* 32 (4): 1–15.

Johnson, T. E., T. N. Archibald, and G. Tenenbaum. 2010. "Individual and Team Annotation Effects on Students' Reading Comprehension, Critical Thinking, and Meta-Cognitive Skills." *Computers in Human Behavior* 26 (6): 1496–1507.

Jonassen, D., M. Davidson, M. Collins, J. Campbell, and B. B. Haag. 1995. "Constructivism and Computer-Mediated Communication in Distance Education." *American Journal of Distance Education* 9 (2): 7–26.

Jopp, R. 2020. "A Case Study of a Technology Enhanced Learning Initiative that Supports Authentic Assessment." *Teaching in Higher Education* 25 (8): 942–958.

Kay, A. E., J. Hardy, and R. K. Galloway. 2020. "Student use of PeerWise: A Multi-Institutional, Multidisciplinary Evaluation." *British Journal of Educational Technology* 51 (1): 23–35.

Kearney, S. 2013. "Improving Engagement: The Use of 'Authentic Self- and Peer-Assessment for Learning' to Enhance the Student Learning Experience." *Assessment & Evaluation in Higher Education* 38 (7): 875–891.

Keevy, M. 2015. "Using Collaborative Learning Exercises to Transfer Pervasive Skills: Some South African Evidence." *Journal of Economic and Financial Sciences* 8 (2): 456–473.

Keshmiri, F., R. Gandomkar, S. M. Hejri, E. Mohammadi, and A. Mirzazadeh. 2019. "Developing a Competency Framework for Health Professions Education at Doctoral Level: The First Step Toward a Competency Based Education." *Medical Teacher* 41 (11): 1298–1306.

Kreijns, K., P. A. Kirschner, and W. Jochems. 2003. "Identifying the Pitfalls for Social Interaction in Computer-Supported Collaborative Learning Environments: A Review of the Research." *Computers in Human Behavior* 19 (3): 335–353.

Lawson, R. A., E. J. Blocher, P. C. Brewer, G. Cokins, J. E. Sorensen, D. E. Stout, G. L. Sundem, S. K. Wolcott, and M. J. Wouters. 2014. "Focusing Accounting Curricula on Students' Long-Run Careers: Recommendations for an Integrated Competency-Based Framework for Accounting Education." *Issues in Accounting Education* 29 (2): 295–317.

Lee, M. R., and T. T. Chen. 2015. "Digital Creativity: Research Themes and Framework." *Computers in Human Behavior* 42: 12–19.

Low, M., G. Samkin, and C. Liu. 2013. "Accounting Education and the Provision of Soft Skills: Implications of the Recent NZICA CA Academic Requirement Changes." *E-journal of Business Education and Scholarship of Teaching* 7 (1): 1–33.

Malone, K., and S. Supri. 2012. "A Critical Time for Medical Education: The Perils of Competence-Based Reform of the Curriculum." *Advances in Health Sciences Education* 17 (2): 241–246.

Mapuya, M. 2021. "First-Year Accounting Student Teachers' Constructivist Learning Experiences, the Lecturer's Role and Implications for Curriculum Implementation." *International Journal of Learning, Teaching and Educational Research* 20 (1): 103–119.

Matthew, S. M., H. G. Bok, K. P. Chaney, E. K. Read, J. L. Hodgson, B. R. Rush, ... and L. K. Molgaard. 2020. "Collaborative Development of a Shared Framework for Competency-Based Veterinary Education." *Journal of Veterinary Medical Education* 47 (5): 578–593.

Maxwell, T. W. 2012. "Assessment in Higher Education in the Professions: Action Research as an Authentic Assessment Task." *Teaching in Higher Education* 17 (6): 686–696.

McGowan, S. 2012. "Going Beyond the Numbers in Teaching Financial Accounting: The Newsletter as an Assignment Option." *Issues in Accounting Education* 27 (4): 1095–1117.

McLoughlin, C., and J. Luca. 2002. "A Learner–Centred Approach to Developing Team Skills through Web–Based Learning and Assessment." *British Journal of Educational Technology* 33 (5): 571–582.

Mehrabi Boshrabadi, A., and M. R. Hosseini. 2021. "Designing Collaborative Problem Solving Assessment Tasks in Engineering: An Evaluative Judgement Perspective." *Assessment & Evaluation in Higher Education* 46 (6): 913–927.

Murphy, E. 2004. "Recognising and Promoting Collaboration in an Online Asynchronous Discussion." *British Journal of Educational Technology* 35 (4): 421–431.

Mustapha, R. B., 2020. "Future Assessment in Higher Education: Reframing Conventional Practices." *Horizon* 2 (1): 19–34.

Nieminen, J. H., M. Bearman, and R. Ajjawi. 2022. "Designing the Digital in Authentic Assessment: is it Fit for Purpose?" *Assessment & Evaluation in Higher Education* 1–15.

Nkhoma, C., M. Nkhoma, and L. K. Tu. 2018. "Authentic Assessment Design in Accounting Courses: A Literature Review." *Issues in Informing Science and Information Technology* 15 (1): 157–190.

Norman, G., J. Norcini, and G. Bordage. 2014. "Competency-Based Education: Milestones or Millstones?" *Journal of Graduate Medical Education* 6 (1): 1–6.

Northrup, P. 2001. "A Framework for Designing Interactivity into Web-Based Instruction." *Educational Technology* 41 (2): 31–39.

Novak, E., R. Razzouk, and T. E. Johnson. 2012. "The Educational Use of Social Annotation Tools in Higher Education: A Literature Review." *The Internet and Higher Education* 15 (1): 39–49.

O'Connell, B., G. D. Carnegie, A. J. Carter, P. Hancock, C. V. Helliard, and K. Watty. 2015. "Shaping the Future of Accounting in Business Education in Australia." Melbourne: CPA Australia.

Organization for Economic Cooperation and Development (OECD). 2017. "PISA 2015 Collaborative Problem-Solving Framework." Accessed 30 November 2021. <http://tiny.cc/accouuz>

Partnership for 21st Century Skills. 2015. "Century Skills – Core Content Integration." Accessed 9 September 2022. <https://bit.ly/3dlMSF0>

Pathways Commission. 2015. "The Pathways Commission: in Pursuit of Accounting's Curricula of the Future." *American Accounting Association*. Accessed 18 April 2021 <https://aaahq.org/Portals/0/images/education/Pathways/15-9-61866.pdf?ver=2021-02-23-175219-123>

Pena-Shaff, J. B., and C. Nicholls. 2004. "Analyzing Student Interactions and Meaning Construction in Computer Bulletin Board Discussions." *Computers & Education* 42 (3): 243–265.

Plant, K., K. Barac, and G. Sarens. 2019. "Preparing Work-Ready Graduates – Skills Development Lessons Learnt from Internal Audit Practice." *Journal of Accounting Education* 48: 33–47.

Rieger, G. W., and C. E. Heiner. 2014. "Examinations that Support Collaborative Learning: The Students' Perspective." *Journal of College Science Teaching* 43 (4): 41–47.

Rossetto, C., and S. Chapple. 2019. "Creative Accounting? The Critical and Creative Voice of Students." *Assessment & Evaluation in Higher Education* 44 (2): 216–232.

Saxena, S. 2013. "How Technology Can Support Authentic Learning." Accessed 7 February 2023. <https://bit.ly/3YIBUeU>

Schmulian, A. 2018. "Approaches to Social Constructivist Accounting Education". Doctoral Dissertation, University of Pretoria.

Schmulian, A., and S. A. Coetzee. 2019. "Students' Experience of Team Assessment with Immediate Feedback in a Large Accounting Class." *Assessment & Evaluation in Higher Education* 44 (4): 516–532.

Schuwirth, L. W., and C. P. Van der Vleuten. 2011. "Programmatic Assessment: From Assessment of Learning to Assessment for Learning." *Medical Teacher* 33 (6): 478–85.

Schuwirth, L. W., and C. P. Van der Vleuten. 2020. "A History of Assessment in Medical Education." *Advances in Health Sciences Education* 25 (5): 1045–1056.

Shaffer, D. W., and M. Resnick. 1999. "'Thick' Authenticity: New Media and Authentic Learning." *Journal of Interactive Learning Research* 10 (2): 195–216.

Siddiq, F., P. Gochyyev, and M. Wilson. 2017. "Learning in Digital Networks–ICT Literacy: A Novel Assessment of Students' 21st Century Skills." *Computers & Education* 109: 11–37.

Silva, I. L. 2018. "How Learning Theories can be Applied in Accounting Education." *Millenium-Journal of Education, Technologies, and Health* 7: 13–20.

Silva, V. L., J. L. Kovalski, R. N. Pagani, A. Corsi, and M. A. S. Gomes. 2020. "Human Factor in Smart Industry: A Literature Review." *Future Studies Research Journal: Trends and Strategies* 12 (1): 1.

Sisternans, I. J. 2020. "Integrating Competency-Based Education with a Case-Based or Problem-Based Learning Approach in Online Health Sciences." *Asia Pacific Education Review* 21 (4): 683–696.

Sithole, B. M., and L. Pereira. 2019. "Towards Constructivist Learning and Teaching in Accounting Education." *Journal of Emerging Trends in Educational Research and Policy Studies* 10 (1): 1–9.

South African Institute of Chartered Accountants (SAICA). 2021. CA(SA) Competency framework. Accessed 9 September 2022. <https://bit.ly/3RXRAYg>

Stanley, T., and S. Marsden. 2012. "Problem-Based Learning: Does Accounting Education Need It?" *Journal of Accounting Education* 30 (3–4): 267–289.

Tan, L. M., and F. Laswad. 2018. "Professional Skills Required of Accountants: What do Job Advertisements Tell Us?." *Accounting Education* 27 (4): 403–432.

Ten Cate, O., and S. Billett. 2014. "Competency-Based Medical Education: Origins, Perspectives and Potentialities." *Medical Education* 48 (3): 325–332.

Timmis, S., P. Broadfoot, R. Sutherland, and A. Oldfield. 2016. "Rethinking Assessment in a Digital Age: Opportunities, Challenges and Risks." *British Educational Research Journal* 42 (3): 454–476.

Tsiligiris, V., and D. Bowyer. 2021. "Exploring the Impact of 4IR on Skills and Personal Qualities for Future Accountants: A Proposed Conceptual Framework for University Accounting Education." *Accounting Education* 30 (6): 621–649.

University of York. 2019. Digital Creativity. Accessed 9 September 2022 <https://subjectguides.york.ac.uk/skills/digital-creativity>

Van der Vleuten, C. P. 2015. "Competency-Based Education is Beneficial for Professional Development." *Perspectives on Medical Education* 4 (6): 323–325.

Van Laar, E., A. J. Van Deursen, J. A. Van Dijk, and J. De Haan. 2017. "The Relation between 21st-Century Skills and Digital Skills: A Systematic Literature Review." *Computers in Human Behavior* 72: 577–588.

Venter, E. R., and C. De Villiers. 2013. "The Accounting Profession's Influence on Academe: South African Evidence." *Accounting, Auditing and Accountability Journal* 26 (8): 1246–1278.

Verwey, S. 2022. "Fourth Industrial Revolution – Beyond Competencies." Accessed 7 February 2023. <https://www.uj.ac.za/news/fourth-industrial-revolution-beyond-competencies/>

Villarroel, V., D. Boud, S. Bloxham, D. Bruna, and C. Bruna. 2020. "Using Principles of Authentic Assessment to Redesign Written Examinations and Tests." *Innovations in Education and Teaching International* 57 (1): 38–49.

Vos, L. 2015. "Simulation Games in Business and Marketing Education: How Educators Assess Student Learning from Simulations." *The International Journal of Management Education* 13 (1): 57–74.

Voshaar, J., M. Knipp, T. Loy, J. Zimmermann, and F. Johannsen. 2022. "The Impact of Using a Mobile App on Learning Success in Accounting Education." *Accounting Education* 1–26.

Vygotsky, L. S. 1978. *Mind in Society: The Development of Higher Psychological Processes*, edited by M. Cole, V. John-Steiner, V. Scribner, and S.E. Souberman. Cambridge, MA: Harvard University Press.

Watts, M. *The Science of Problem Solving: A Practical Guide for Science Teachers*. London: Cassell.

Wilburn, N. L., and B. G. Kilpatrick. 2020. "A Mini-Course Approach to Incorporate IFRS into the Accounting Curriculum." *Journal of the Academy of Business Education* 21: 32–46

Wilson, R. M. 2011. "Alignment in Accounting Education and Training." *Accounting Education* 20 (1): 3–16.

Winterton, J., and J. J. Turner. 2019. "Preparing Graduates for Work Readiness: An Overview and Agenda." *Education + Training* 61 (5): 536–551.

Woo, Y., and T. C. Reeves. 2007. "Meaningful Interaction in Web-Based Learning: A Social Constructivist Interpretation." *The Internet and Higher Education* 10 (1): 15–25.

World Economic Forum. 2018. "The Future of Jobs Report 2018". Accessed 9 September 2022. http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf

Zhu, X., B. Chen, R. M. Avadhanam, H. Shui, and R. A. Zhang. 2020. "Reading and Connecting: Using Social Annotation in Online Classes." *Information and Learning Sciences* 121 (5/6): 261–271.

2 CHAPTER 2: DEVELOPING DIGITAL CREATIVITY THROUGH AUTHENTIC ASSESSMENT

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2.1 INTRODUCTION

This study reports on the use of an authentic assessment to develop students' digital creativity in an undergraduate competency-based accounting course. In particular, this study documents the design and development of the assessment and analyses the students' digital creative outputs and their reflections on developing these outputs.

The 21st century workplace is undergoing significant transformation as a result of the Fourth Industrial Revolution (Gray 2016; Schwab 2016; Tan and Laswad 2018). "[H]ow we communicate with one another, interact with government, purchase goods and services, and consume and create media" is all changing as a result of digital technology (ECDL Foundation 2012, 1). Individuals without the necessary digital competencies risk redundancy in the 21st century workplace (Greene, Yu and Copeland 2014; Van Laar et al. 2017; Tan and Laswad 2018; Feintzeig 2020). In addition to digital competencies, creativity is another of the most needed competencies in the 21st century workplace (World Economic Forum 2018). Creativity is the "ability to see new opportunities, to produce original ideas, to flexibly adapt to changing situations, and to apply one's imagination to solve complex problems" (Puccio 2017).

At the intersection of digital technology and creativity is the emerging domain of digital creativity (Lee and Chen 2015). Digital creativity is the use of "digital tools and technologies to explore creative ideas and new ways of displaying your ideas, research, or work" (University of York 2019, 1). Practically, digital creativity involves the use of digital technology to open up new ways of thinking, to create new juxtapositions and new ways of communicating data and historical materials (Lee and Chen 2015; University of York 2019). While digital creativity has been explored from the perspective of domains traditionally

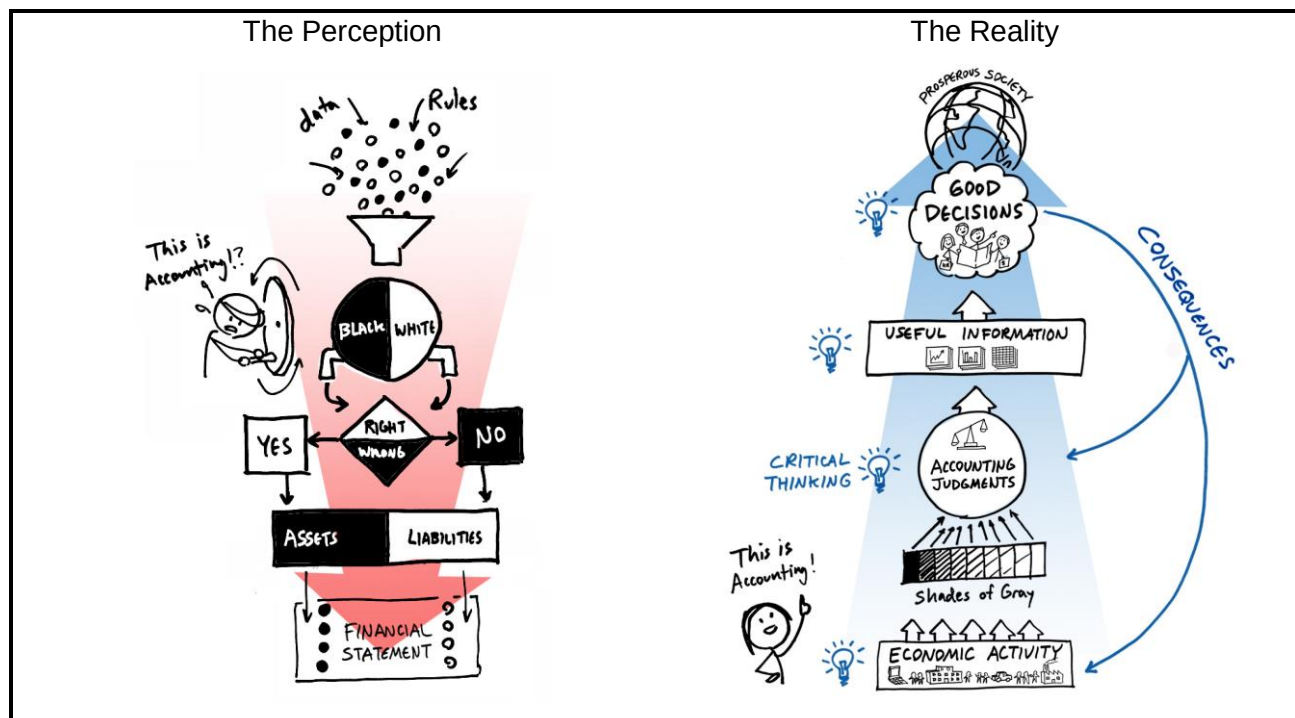
perceived as creative, *inter alia*, computer-generated artwork and music and the creative use of blogs and social network sites (Lee and Chen 2015), it has not yet been explored in the accounting domain. Integrating the development of students' digital creativity into accounting courses, that are traditionally perceived as lacking creativity, should better prepare these students for the dynamic and fluid 21st century workplace.

2.2 DIGITAL CREATIVITY IN ACCOUNTING

Accountants are expected to be competent critical thinkers and problem-solvers, and, importantly, are expected to be creative and innovative in their critical thinking and problem solving (Baril et al. 1998; Saemann and Crooker 1999; Lawson et al. 2014; Pinho 2015; Birkey and Hausserman 2019; Powell et al. 2020). Despite these expectations, creativity is not conventionally associated with accounting, as the subject is often labelled as narrow and boring (Mladenovic 2000; Carnegie and Napier 2010; Krom and Williams 2011; Bryant, Stone and Wier 2011; McGowan 2012, Rossetto and Chapple 2019). Stereotypically, accounting is perceived as the processing of black and white historical data and information according to stringent rules, with right or wrong answers (Pathways Commission 2015). In reality, accountants are, however, expected to exercise judgement in solving complex problems and communicating useful data and information about complex economic events to users of that data and information for their decision making (Figure 2-1) (Pathways Commission 2015).

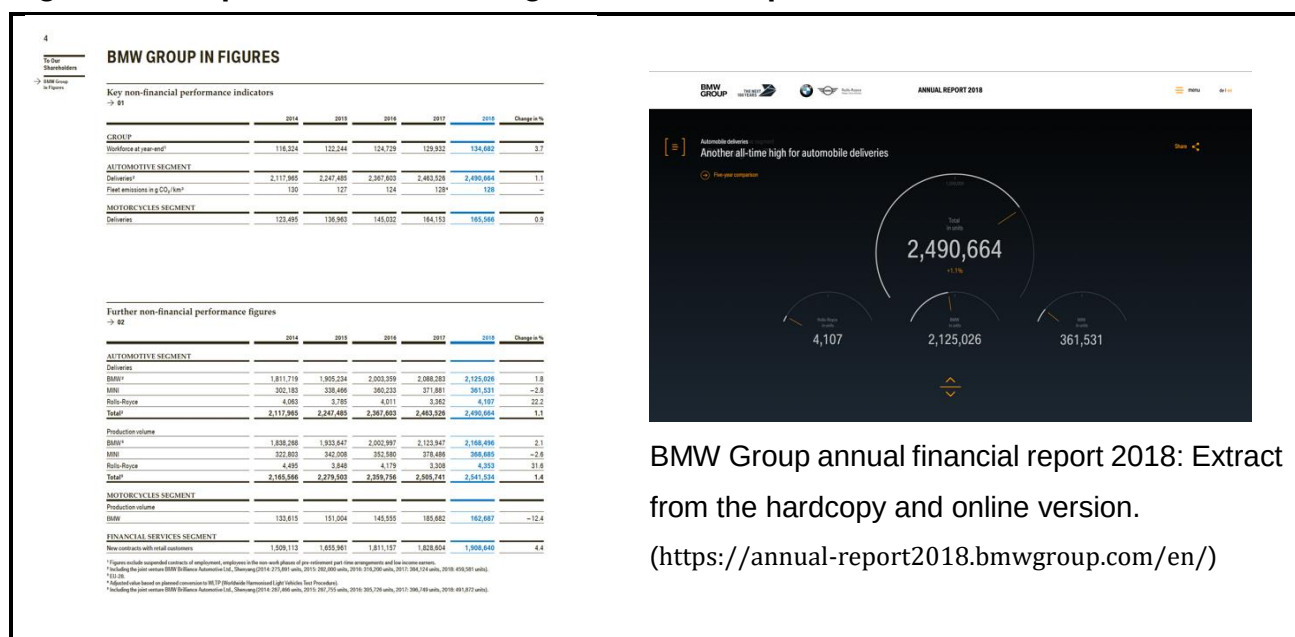
The data and information that is communicated by accountants in the form of a company's financial reports, is powerful as it has the potential to, *inter alia*, impact investing or lending decisions and provide legitimacy to organisations (Hines 1988; Deegan and Unerman 2006). While these financial reports have traditionally been paper-based and presented in black and white, digital technology has opened up new ways of communicating useful data and information for decision making, and creating new opportunities for presenting and juxtaposing additional data and information in ways not previously possible (Figure 2-2).

Figure 2-1: The perception and reality of accounting



Source: Diagrams available from The Pathways Vision Model at www.aaahq.org/Pathways-Commission

Figure 2-2: Paper-based versus digital financial reports



Source: <https://www.bmwgroup.com/en/investor-relations/financial-reports.html>

It is, however, submitted that the teaching of accounting, and the related research that informs this teaching, continues to focus on black and white paper-based financial reports, as opposed to more digital creative approaches. This study, therefore, provides a detailed description of the design, development, and facilitation of an authentic assessment for

learning in a competency-based accounting course, requiring students to be digitally creative in presenting their ideas, research and work and reports on the students' outputs and their experiences of the assessment.

2.3 AUTHENTIC ASSESSMENT IN COMPETENCY-BASED ACCOUNTING EDUCATION

Assessment plays an important role in competency-based education (Boud and Falchikov 2006; Osborne, Dunne and Farrand 2013; Ashford-Rowe, Herrington and Brown 2014; Harris et al. 2017; Villarroel et al. 2020). Competency-based assessment facilitates learning (Boud and Falchikov 2006; Ashford-Rowe, Herrington and Brown 2014) and provides certification of achievement to society, as an indicator of being competent to function independently in the real world (Boud and Falchikov 2006). Despite accounting education's transition to competency-based education (Abbasi 2013; Borgonovo, Friedrich and Wells 2019), it is submitted that assessment in accounting education continues to be characterised by the high stakes summative assessment of knowledge for certification purposes rather than competency-based assessment (Wilson 2011; Coetzee and Schmulian 2012; Venter and De Villiers 2013). Summative assessments are often isolated from the real world and based on fictitious, and often over-simplified, cases (Boud 2000; Gulikers, Bastiaens and Kirschner 2006; Siddiq, Gochyyev and Wilson 2017; Wiewiora and Kowalkiewicz 2019). Consequently, these assessments rarely facilitate learning and the development of graduate competencies and there is, therefore, an urgent need to change the nature of assessment (Boud 1990; Brown 2005; Van der Vleuten and Schuwirth 2005; Schuwirth and Van der Vleuten 2011) from purely summative approaches, to competency-based 'assessments for learning' (Schuwirth and Van der Vleuten 2011; Villarroel et al. 2018), incorporating authentic assessment tasks (Cumming and Maxwell 1999; Guliker, Bastiaens and Kirschner 2004; Frank et al. 2010; Harris et al. 2010; Ashford-Rowe, Herrington and Brown 2014; Siddiq, Gochyyev and Wilson 2017; Powell et al. 2020; Villarroel et al. 2020).

Situated learning theorists (Collins 1988; Lave and Wenger 1991) and constructivists (Vygotsky 1978) both acknowledge that learning and constructing new knowledge and competencies should occur in authentic real-world contexts (Brown, Collins and Duguid 1989). Authentic assessment tasks, therefore, represent the constructive alignment of

teaching, learning, and assessment within the context of the real world and allow students to construct new knowledge and develop the competencies necessary in the workplace (Ashford-Rowe, Herrington and Brown 2014; Vos 2015; James and Casidy 2018; Farrell 2020; Powell et al. 2020; Sotiriadou et al. 2020). Through engaging with the practical problems, challenges and complexities that students are likely to encounter in the workplace, they can develop the competencies needed for the workplace (Gulikers, Bastiaens and Kirschner 2006; Gulikers et al. 2008; Adie, Hee and Wharton 2010; Maxwell 2012; James and Casidy 2018; Sotiriadou et al. 2020; Villarroel et al. 2020) and enhance their employability (Ashford-Rowe, Herrington and Brown 2014; Villarroel et al. 2018; Wiewiora and Kowalkiewicz 2019; Farrel 2020; Sotiriadou et al. 2020).

2.4 THE ASSESSMENT

The assessment for learning, designed and developed in this study, is one of many assessments in a 'programme of assessments' (see Schuwirth and Van der Vleuten 2011) administered throughout an academic year in an accounting course. Given the pressure to prepare students for the high stakes summative professional assessment at the culmination of their studies (Venter and De Villiers 2013), many of the assessments in this accounting course, and those preceding it, remain high stakes, pen-and-paper, summative assessments of learning requiring highly technical and rule-based answers (see Coetzee and Schmulian 2012; 2013). However, as summative assessments of learning do not necessarily equip students for all the challenges that they might face in the workplace (Boud 2000; Gulikers, Bastiaens and Kirschner 2004; Gulikers, Bastiaens and Kirschner, 2006; Schuwirth and Van der Vleuten 2011; Siddiq, Gochyyev and Wilson 2017; Wiewiora and Kowalkiewicz 2019), an authentic assessment for learning was developed for inclusion in the targeted course's programme of assessments.

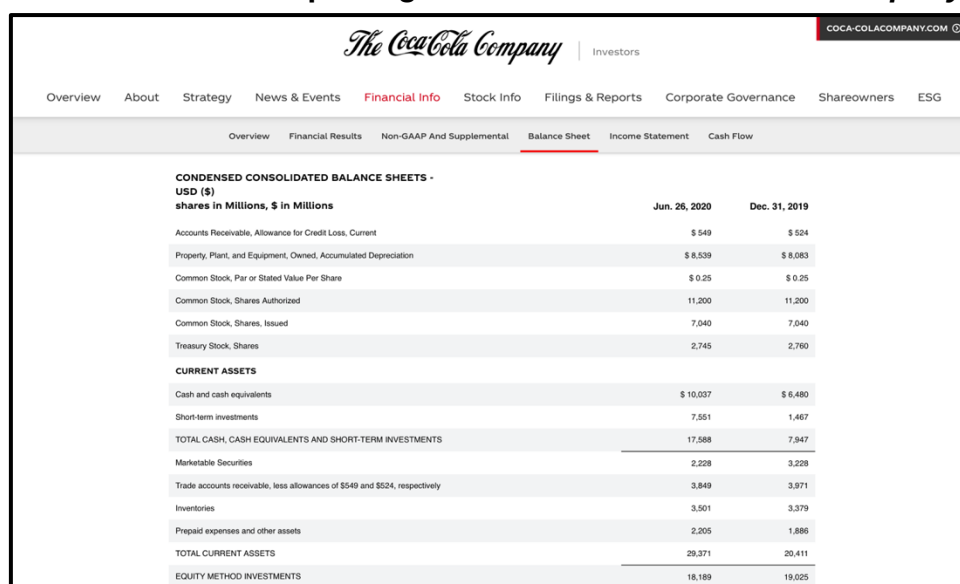
2.4.1 Learning outcome

As a first step in the development of the authentic assessment, the learning outcome for this assessment was stated as:

“Given a real-world company’s publicly available financial information, students will identify and communicate faithfully represented and relevant financial information in respect of that company in a digital creative way to users of that financial information.”

Guided by this learning outcome, this assessment required the students to collaboratively research *The Coca-Cola Company* and identify any particular aspects, of interest to them, that would be considered relevant to users of the financial report of the company and that can be faithfully represented. *The Coca-Cola Company* is a well-known and established brand, considered to be sufficiently researchable. The economic events associated with this business are not expected to be distant from the students’ frame of reference, as most students will be able to relate to it. The students were then required to synthesise and communicate, to potential users of the company’s financial report, the results of their research through a digital creative output. This output should enhance the communication of financial information currently evident on the financial reporting section of the company’s website, which is largely text based (Figure 2-3).

Figure 2-3: Extract from the reporting section of *The Coca-Cola Company* website



CONDENSED CONSOLIDATED BALANCE SHEETS - USD (\$) shares in Millions, \$ in Millions		Jun. 26, 2020	Dec. 31, 2019
Accounts Receivable, Allowance for Credit Loss, Current		\$ 549	\$ 524
Property, Plant, and Equipment, Owned, Accumulated Depreciation		\$ 8,539	\$ 8,083
Common Stock, Par or Stated Value Per Share		\$ 0.25	\$ 0.25
Common Stock, Shares Authorized		11,200	11,200
Common Stock, Shares, Issued		7,040	7,040
Treasury Stock, Shares		2,745	2,760
CURRENT ASSETS			
Cash and cash equivalents		\$ 10,037	\$ 6,480
Short-term investments		7,551	1,467
TOTAL CASH, CASH EQUIVALENTS AND SHORT-TERM INVESTMENTS		17,588	7,947
Marketable Securities		2,228	3,228
Trade accounts receivable, less allowances of \$549 and \$524, respectively		3,849	3,971
Inventories		3,501	3,379
Prepaid expenses and other assets		2,205	1,886
TOTAL CURRENT ASSETS		29,371	20,411
EQUITY METHOD INVESTMENTS		18,189	19,025

Source: <https://investors.coca-colacompany.com/financial-information>

2.4.2 Design and development of the assessment

The design and development of the authentic assessment was informed by the eight critical design elements of an authentic assessment, proposed by Ashford-Rowe, Herrington and Brown (2014) (Table 2-1). Application of these elements should assist in designing an assessment that demonstrates fidelity and authenticity (Forsyth and Evans 2019).

Table 2-1: Critical design elements of authentic assessment

-
1. To what extent does the assessment activity *challenge* the assessed student?
 2. Is a *performance, or product*, required as a final assessment outcome?
 3. Does the assessment activity require that *transfer* of learning has occurred, by means of demonstration of skill?
 4. Does the assessment activity require that *metacognition* is demonstrated, by means of a critical reflection, self-assessment or evaluation?
 5. Does the assessment require a product or performance that could be recognised as *authentic* by a client or stakeholder?
 6. Is *fidelity* required in the assessment environment? And the assessment tools (actual or simulated)?
 7. Does the assessment activity require *discussion* and *feedback*?
 8. Does the assessment activity require that students *collaborate*?
-

Source: Ashford-Rowe, Herrington and Brown 2014

1. To what extent does the assessment activity *challenge* the assessed student?

Challenge is an important factor in the learning process (Hattie 2012). Too great a challenge may demotivate students, while too little challenge may disengage learners (Larmer, Mergendoller and Boss 2015). Determining the optimal level of challenge for a diverse student cohort is, therefore, difficult and determining this level is a matter of professional judgement for the instructor (Larmer, Mergendoller and Boss 2015). Several different elements contributed to the challenge of this particular assessment. Firstly, the concept of digital creativity was new to the students and had not been addressed with the students during their preceding formal undergraduate education. Secondly, little structure was provided to the students, for example, the scope of financial information to include in the students' required output was left entirely at the discretion of the students. The students were also not provided with any exemplars with regards to the output required. This allowed the students an opportunity to showcase their own ideas, without being influenced by

exemplars (To and Carless 2016), but did increase the level of challenge. Lastly, given the high stakes individualistic nature of their undergraduate degree programme, collaboration in a team may present a further challenge for the students, as they rarely are exposed to collaborative work (Schmulian and Coetzee 2019).

2. Is a *performance*, or *product*, required as a final assessment outcome?

Most work done by students at university is confined to notebooks, files or online folders. An authentic assessment provides an opportunity for students to develop a product that could potentially be shared beyond these notebooks, files and folders (Larmer, Mergendoller and Boss 2015). Students may perceive such an assessment as more authentic and consequential than a graded paper that is simply filed away (Larmer, Mergendoller and Boss 2015). The students were, therefore, required to develop a digital creative output using any available digital software, applications or solutions that could assist them to potentially present the product of their research to the users of *The Coca-Cola Company's* financial report.

3. Does the assessment activity require that *transfer* of learning has occurred, by means of demonstration of skill?

An authentic assessment should support the idea that knowledge and skills learnt in one area can be applied within another, often unrelated, area (Ashford-Rowe, Herrington and Brown 2014). In the instance of this assessment, the students were required to transfer their knowledge of financial reporting, which had to date been applied in presenting black and white paper-based financial reports, to an alternative digital creative medium. Given that this medium is unrelated to the students' traditional course content, the students were referred to the Substitution Augmentation Modification Redefinition (SAMR) model. The SAMR model, represented as a ladder, is a four-level approach to selecting, using, and evaluating technology in education (Puentedura 2014; Hamilton, Rosenberg and Akcaoglu 2016). The purpose of suggesting the SAMR model was to inform and guide the students' technology integration efforts, and to discourage students from submitting a purely digitised output, as opposed to a fully digital creative output – that demonstrates a higher level of digital integration.

4. Does the assessment activity require that *metacognition* is demonstrated, by means of a critical reflection, self-assessment or evaluation?

Reflection is widely acknowledged as a means to enable students to extend their learning experiences beyond the classroom and is regarded as a critical element of authentic assessment (Ashford-Rowe, Herrington and Brown 2014). When reflection is applied to an individual's own thinking process, this is referred to as metacognition. In a professional real-world workplace, the ability to reflect, evaluate and self-monitor thoughts and tasks, is critical to independent work performance (Ashford-Rowe, Herrington and Brown 2014). The students were, therefore, encouraged to formally reflect on their individual learning as part of the assessment process, utilising the reflection instrument of Schmulian and Coetzee (2019).

5. Does the assessment require a product or performance that could be recognised as *authentic* by a client or stakeholder?

Authenticity is a complex concept, but it's generally synonymous with making a learning experience as 'real' as possible (Larmer, Mergendoller and Boss 2015). Authenticity can be addressed in four thinkable ways, possibly at the same time (Strobel et al. 2013). Firstly, context authenticity requires authentic assessments or activities to resemble real life experiences (Strobel et al. 2013). This assignment included a suspension of reality and required the students to take the role of an accountant responsible for aspects of the financial reporting of *The Coca-Cola Company*. Secondly, task authenticity requires students to make decisions in practical contexts (Strobel et al. 2013) such as those that the students were required to make by the unstructured problem posed to them in identifying useful financial information and presenting this financial information to users of that information in a digital creative manner. Thirdly, the assessment may strive for impact authenticity which requires that the product of the authentic assessment should potentially have an impact on a real-world audience (Strobel et al. 2013), such as potentially influencing the decisions of users of the financial information presented by *The Coca-Cola Company*. Lastly an authentic assessment may have personal or value authenticity in that the assessment makes the experience authentic on a personal level for the students (Strobel et al. 2013) through, for example, allowing the students to engage with content or a task that

is personally valued by them, such as the financial reporting of aspects pertaining to environmental or social justice issues by *The Coca-Cola Company*.

6. Is *fidelity* required in the assessment environment? And the assessment tools (actual or simulated)?

In designing an authentic assessment, the instructor should consider the fidelity of the environment within which the assessment is to occur, as well as the use of any tools that would be considered appropriate to this environment (Ashford-Rowe, Herrington and Brown 2014). Therefore, to what extent would reality need to be suspended and to what degree would an authentic real-world environment and tools need to be simulated. In reporting actual financial information of *The Coca-Cola Company*, reality is suspended to the extent that students play the role of an accountant for *The Coca-Cola Company*. However, very little simulation was required beyond this, as students were required to use actual financial information of *The Coca-Cola Company* and to present this information in a digital creative manner using universally available digital software and applications that could potentially reach the users of *The Coca-Cola Company's* financial report.

7. Does the assessment activity require *discussion* and *feedback*?

The ability to discuss and give and receive feedback is critical to workplace performance, and should, therefore, be included in an authentic assessment activity (Ashford-Rowe, Herrington and Brown 2014). Team members represent one of the apparent sources of feedback in student learning teams (Schmulian and Coetzee 2019) and peer feedback can enhance teamwork processes (Schmulian and Coetzee 2019), therefore, this assessment was designed to be collaborative with student teams working together to develop the digital creative output. In addition to peer feedback, at the conclusion of the assessment, the instructors provided holistic feedback on the assessment. The digital creative output of the highest scoring student teams was showcased, debated and discussed. As part of the instructor feedback, exemplars of digital creative financial reports of current real-world companies were also provided to the students (Figure 2-4).

Figure 2-4: Exemplars



8. Does the assessment activity require that students *collaborate*?

Team assessment places the emphasis on authentic interactions and teamwork and students learning to collaborate (Schmulian and Coetzee 2019), which is an indispensable skill in the modern workplace (Ashford-Rowe, Herrington and Brown 2014). To encourage authenticity, students were clustered into teams based on their prior academic achievement in the course. Teams were formed by randomly selecting students from these clusters to form teams of approximately five students. Each team included academically stronger and weaker students (Schmulian and Coetzee 2019). Students were not cognisant of how these teams were selected. A numerical sorted list, based on student numbers, was published, indicating the name of each students' team and the respective team members. Each team then had the responsibility to contact each other and arrange for a workable approach to deliver the required digital creative output.

Time allowed

In addition to incorporating the eight critical design elements of an authentic assessment (Ashford-Rowe, Herrington and Brown 2014) in the design and development of this particular authentic assessment, consideration was given to the time allowed for the student teams to complete the required digital creative outputs. The assessment required the students to follow a process of inquiry to guide their research activities. To allow students the opportunity to develop their digital creativity competence, this process of inquiry should be over a longer, rather than shorter period of time (Larmer, Mergendoller and Boss 2015). Developing competencies such as problem solving, and creativity, within a digital environment, requires time and involvement. Furthermore, sufficient time is required to allow collaborating teams the opportunity to go through the various developmental phases of forming, storming, norming and performing (Tuckman 1965). Consequently, the students were given a month to create their teams' digital creative output.

2.5 THE OUTPUTS

The total student cohort (N=493) were clustered into 99 student teams, yielding 99 digital creative outputs. These outputs were analysed and categorised based on the primary functionality thereof, the level of creativity demonstrated, and the level, in terms of the SAMR model (Table 2-2), at which the chosen functionality enabled the optimal communication of the content in a digital manner. Where outputs combined various functionalities (e.g., websites including links to presentations, presentations including videos etc.), the dominant function was noted. A perception of the level of creativity of each output was formed, but this by its nature was a more subjective process. Whether the student teams' use of the platform optimised the communication of the content that the student teams chose to share, were considered in evaluating the level at which the functionality of the chosen digital platform enabled the optimal communication of the selected content in a digital manner. LinkedIn, for example, supports the communication of content in longer text-based posts with embedded links to external sites, whereas Instagram is more visual in its use of images, image panels and stories. Where the student teams' use of their chosen platform merely substituted typed, black and white PDF financial reports, the output was considered at the substitution level. Conversely, where the student teams redefined the communication of

financial information through optimally using the affordances of their chosen platform, in a way that would have been inconceivable without the use of the functionality of that technology, the output was considered at the redefinition level. The analysis of the outputs was repeated at a later point in time. Discrepancies between initial and subsequent analyses were scrutinised and resolved.

Table 2-2: Summary of analysis of digital creative outputs

Functionality of output		Number of student teams (N=99)
Presentations		43
Websites		24
Videos		13
Smartphone applications		8
Social media platforms		6
Other		5
Level of digital integration		Number of student teams (N=99)
Transformation		
Redefinition	Technology allows for the creation of new tasks, previously inconceivable	4
Modification	Technology allows for significant task redesign	46
Enhancement		
Substitution and Augmentation	Technology acts as a direct substitute with no or little functional change or improvement	49
Level of creativity		Number of student teams (N=99)
Output is presented in a conventional manner and merely a repetition of current information on the website.		16
Output is presented in an original and creative manner.		68
Output is presented in a highly creative manner. Demonstrates willingness to be experimental and enhances current information on the website.		15

Most of the student teams attempted to be digitally creative by using digital tools and technologies to display their ideas, research, or work. However, when applying the SAMR model to evaluate the level of digital integration in their outputs (Table 2-2), many of the outputs were at the lowest level of substitution and augmentation (n=49) as the student teams did not optimally embrace the functionality of their chosen digital platforms in modifying (n=46) or redefining (n=4) the communication of financial information. The chosen platforms were often only used as a source to provide links to existing information in PDF format on the website of *The Coca-Cola Company*, with little attempt at optimal use of the platforms' features to achieve modification or redefinition of financial reporting. This was not

unexpected, given that this assessment was the first to challenge the students to be digitally creative.

The majority of the student teams developed **presentations** (n=43), using platforms such as *PowerPoint*, *Prezi*, *Google Slides* or *Beautiful.ai*, or **websites** (n=24), using platforms such as *wixsite.com* and *weebly.com*. The inclusion of audio, links to existing *Coca-Cola* videos, graphs, summarised tables and/or hyperlinks in the presentations and websites, were considered as either augmentation or modification of information, depending on whether the inclusion enhanced or transformed the existing information of *The Coca-Cola Company*. An example of a presentation at the modification level is provided in Figure 2-5.

Figure 2-5: Presentation including hyperlinks and graphs at the modification level



The perception was that the student teams' attempts at creativity primarily manifested in the visual elements of these outputs as opposed to the manner in which the information was communicated or through the choice or integration of media, applications or other resources. For example, changes in operating cash flows was in one instance illustrated with reference to glasses filled at different levels with *Coca-Cola* (Figure 2-6).

Figure 2-6: Website explaining changes in cash flows in a creative manner



Outputs in the form of **videos** (n=13) were primarily narrated PowerPoint presentations, with existing *Coca-Cola* videos embedded. The videos were generally recognised as less static than the websites and presentations due to the added sound, voice overs and movement, but the nature and format of financial information included were very similar. *Coca-Cola* images and backtrack sounds used in these videos provided a creative dimension. An example of a video output at the modification level is provided in Figure 2-7.

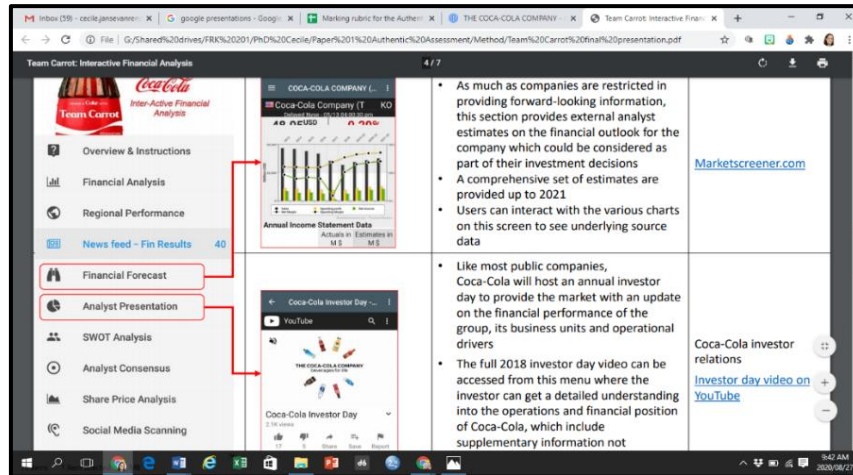
Figure 2-7: Video output at the modification level



Eight student teams (n=8) endeavoured to develop a **smartphone application** to present information to users of *The Coca-Cola Company's* financial reports. One of these student teams was successful at developing and publishing a fully functional application (Figure 2-8). This application incorporated internal and external sources with interactive links to, *inter alia*, news feeds, analyst presentations and social media sites, resulting in the redefinition

of existing financial information relating to *The Coca-Cola Company*. This student team optimally embraced the functionality of a smartphone application.

Figure 2-8: Smartphone application at the redefinition level



The other student teams ($n=7$) were unable to publish their smartphone application prototypes given software cost and publishing restrictions for mobile applications, but demonstrated its intended functionality on either a PowerPoint presentation, video or other source. These applications were mostly creatively designed with links to a variety of other resources.

The student teams that selected **social media platforms** ($n=6$) to communicate their chosen financial information, used Instagram ($n=3$), Blogs ($n=2$) and Twitter ($n=1$). The student teams demonstrated creativity in their willingness to be experimental with modern and popular forms of social media communication, thereby enhancing the presentation and reach of current financial information available for *The Coca-Cola Company*. The level of digital integration of these outputs were a mix between the modification and redefinition levels. When the functionality of the selected platform, for example, Instagram's stories functionality, was not optimally embraced, the level of digital integration was deemed to be at the modification level (Figure 2-9), as opposed to instances where the student teams optimally embraced the functionality of the platform, resulting in the redefinition of information (Figure 2-10).

Figure 2-9: Instagram output at the modification level

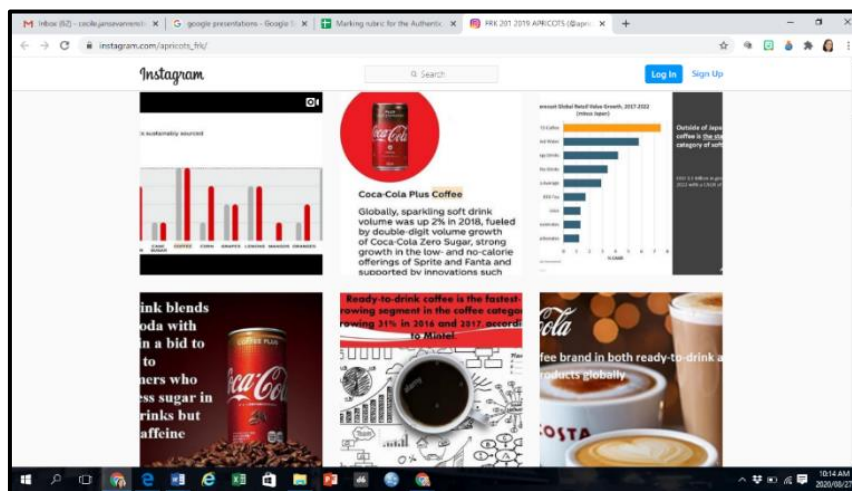
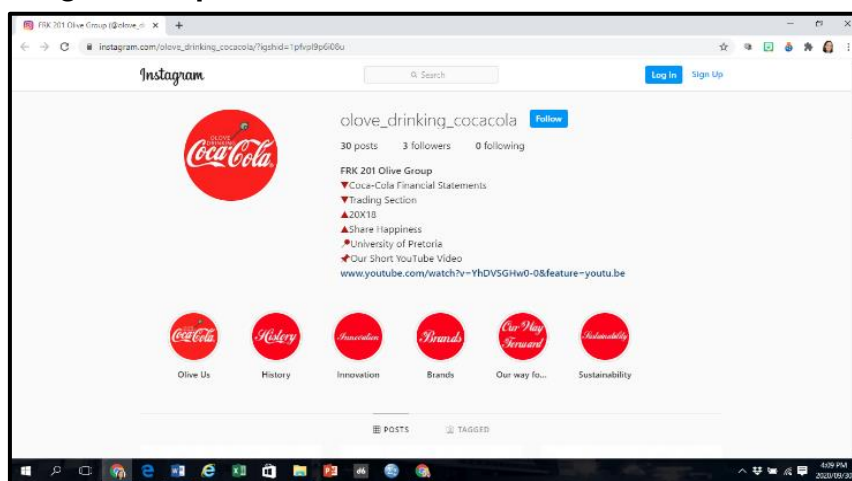


Figure 2-10: Instagram output at the redefinition level



The level of creativity in all outputs, provided little evidence of the students' ability to see new opportunities, to produce original ideas, to flexibly adapt to changing situations and the application of imagination to solve complex problems. It is, however, submitted that this is a standard that is challenging to attain for a first attempt at digital creativity, particularly in an environment not traditionally characterised as being creative.

2.6 THE STUDENTS' EXPERIENCES

In addition to providing a detailed description of the design and development of the authentic assessment and analysing the student teams' digital creative outputs, the students' reflections on their experiences of the assessment were analysed. Understanding more

about the students' experiences of the assessment may improve the process of enabling students to develop their digital creativity. The methodology for this study, therefore, includes some characteristics of phenomenology (Husserl [1900], 2002) as it seeks to understand the phenomenon of an authentic assessment with a digital creative output through the eyes of the students taking part in it. Such an interpretive phenomenological approach can provide 'startling new insights' into education related issues (Van der Mescht 2004, 1), such as this authentic assessment for learning.

2.6.1 Survey approach

A mixed methods approach was adopted. Quantitative data were generated using a yes/no response and a scaled Likert-attitude response (1 – very negative to 7 – very positive). Open response questions were used to collect qualitative data, to gain a deeper understanding of the students' experiences of the assessment. The survey instrument primarily drew on questions from an instrument developed by Schmulian and Coetzee (2019), which enabled students' reflections on another assessment for learning. These questions were modified to reflect the particular focus of this study, namely the development of digital creative outputs. Selected open response questions, included in the study by Wiewiora and Kowalkiewicz (2019), were added to explore the students' perceptions, or changes therein, of financial reporting in general, as a consequence of the authentic assessment. The survey instrument was independently reviewed by subject matter experts and education specialists for the design and the clarity of the questions. Suggestions following this review were incorporated into the final survey instrument. The survey instrument was delivered using *Google Forms* following ethical clearance obtained from the institutional review board. The survey instrument questions are presented in Table 2-3.

2.6.2 Analysis

The quantitative data were analysed in *SPSS Statistics 26.0*. An initial data integrity check was performed and descriptive statistics (e.g., median) and frequencies were calculated. Means and standard deviations are unsuitable for ordinal Likert scale responses (Jamieson 2004). "For example, what does the average of 'never' and 'rarely' really mean? Does 'rarely and a half' have a useful meaning?" (Sullivan and Artino 2013, 541). For rating scale items,

the distance between two response categories, for example, the distance from ‘Strongly disagree’ to ‘Disagree’ may not be the same as the distance from ‘Agree’ to ‘Strongly agree’ (Cohen, Manion and Morrison 2017). Additionally, if responses are grouped at the high and low ends, the mean may appear to be the neutral or middle response, but this may not faithfully characterise the data (Sullivan and Artino 2013). Consequently, the median should be used as the measure of central tendency for Likert scale ordinal data (Jamieson 2004; Sullivan and Artino 2013).

Table 2-3: Survey instrument questions

1.	On a scale of 1 (very negative) to 7 (very positive), rate your overall experience of being required to develop a digital creative output.
2.	Tell us of your experience in developing a digital creative output.
3.	How did you experience developing a digital creative output, in comparison to the “Required” of a traditional Financial Reporting assessment/assignment?
4.	If you designed an assessment that required a digital creative output, what would you do differently and why?
5.	What ALL do you think this assessment, that required a digital creative output, was actually assessing?
6.	Did this assessment, that required a digital creative output, challenge your own perceptions of financial reporting?
7.	Why did this assessment, that required a digital creative output, challenge your own perceptions of financial reporting, or why did it not?
8.	Would you want to experience an assessment similar to this assessment that required a digital creative output, again during your degree?
9.	Why would you, or why would you not, want to experience an assessment, similar to this assessment that required a digital creative output, again during your degree?
10.	Is there anything we should have asked you about in your reflection, but haven’t?
11.	Is there anything further that comes to mind in your reflection that you would like to add?

The qualitative data from the survey instrument were analysed through a content analysis and by identifying themes from the reflections provided by the students (Cooper 2017) that would be relevant to their experiences of the authentic digital creative assessment. Basic themes were developed and coded using *NVivo 12*.

2.6.3 Descriptive statistics

The survey responses (N=428) yielded a response rate of 87%. The majority of the students (75%; n=319) experienced the development of a digital creative output as either ‘very

positive', 'positive' or 'slightly positive' (Median=6) (Table 2-4). 88% of the students (n=376) indicated that this assessment challenged their own perceptions of financial reporting (Table 2-4) while the majority of students (62%; n=264) further indicated that they would want to experience an assessment similar to this assessment again during their degrees (Table 2-4).

Table 2-4: Students' experiences of the authentic assessment

Quantitative survey questions	On a scale of 1 (very negative) to 7 (very positive), rate your overall experience of being required to develop a digital creative output.	Did this assessment, that required a digital creative output, challenge your own perceptions of financial reporting?		Would you want to experience an assessment similar to this assessment that required a digital creative output, again during your degree?	
		Yes (n)	No (n)	Yes (n)	No (n)
Total (N=428)	6	376	52	264	164
Overall experience				Total (n=428)	
				n	%
Very negative				7	1.6
Negative				16	3.7
Slightly negative				31	7.2
Neutral				55	12.9
Slightly positive				97	22.7
Positive				162	37.9
Very positive				60	14.0

2.6.4 Qualitative analysis

The qualitative analysis provided deeper insights into, and a richer understanding of, the initial quantitative results, and confirmed the general positivity from the students towards the authentic assessment to develop a digital creative output. A student commented that *“the experience was quite impressive since it let me to do something which is different from dealing with financial information recording as usual, it enabled me to use creativity though I was still dealing with the financial information but it brought more fun and thinking out of the box”*.

The **authenticity** of developing a digital creative output for *The Coca-Cola Company*, in particular, appears to have contributed to the students' positive experience thereof. The

students commented that the assessment provided *“fantastic exposure to what could be coming in the future in terms of financial reporting”* and *“prepared [them] for the workplace and the technological changes in the corporate world”*. In developing the digital creative outputs, the students *“read through integrated and sustainability reports and followed the news of a company. This is something new and gave me real life application to the knowledge I have from university and to see how everything links”*. The assessment also made the students appreciate that it is *“important to understand the financials fully in order to present the financials in a new and creative way”*. *“It made me realise there is a difference between being able to do the questions and truly understand financial statements in their entirety”*.

The student responses alluded to each of the four thinkable ways of authenticity (Strobel et al. 2013). Firstly, in terms of **context authenticity**, a student commented that *“I feel that the experience was incredibly superior to traditional financial reporting assignments, as it actually required us to engage with real-world information in a unique and interesting way, which I believe benefits us students more than what a traditional financial reporting assignment would, as these traditional assignments are essentially re-iterations of the assessments an[d] year tests that we already perform throughout the year”*. Secondly, the students acknowledged the **task authenticity** of the assessment in *“assessing [their] ability to research financial information that [they] think would be relevant to the different users of the financial statements”*. Thirdly, students commented on the **impact authenticity** of the task and that the assessment made them, *“think in a different sort of way, because the creative digital output of mine will be seen by the public. This changed the way I wanted to present my information, because you would not only want the information to be accurate and relevant, you also want it to be easy to interact with and have nice aesthetics to it”*. Lastly, the **personal/value authenticity** of the assessment made the students realise *“that in this current age, financial reporting must now include information besides purely financial information – as an example financial reporting now should place emphasis on the impact firms have on the environment”*.

Despite the authenticity of the assessment being widely recognised amongst the students, some students did not share this view – *“I believe it is unnecessary and irrelevant to the degree”*; *“I cannot see its relevance to the main skills and training that the degree is*

supposed to equip one with” and “It didn’t test my knowledge of what I’m studying, but rather tested my creativity and computer skills”. Comments such as these suggest that some students are not yet mindful of the significant transformation that is taking place in the 21st century workplace, including the accounting profession.

The objective of financial reporting is the provision of useful information to users of financial reports (International Accounting Standards Board (IASB) 2018) and this assessment appears to have enabled the students to gain deeper and more practical insights of this objective. *“It challenged my perceptions of financial reporting as it actually made me identify useful information and helped me realise that different information is useful to different individuals”. “Since financial reports are usually just black and white numbers that doesn’t always mean something to the users, it challenged me into seeing the financial reports from the point of view of the users and think about what they want to see and what they might not understand”*. A few students were, however, of the opinion that the assessment did not challenge their perception of financial reporting with comments such as *“a creative digital output is just a different way of representing financial reporting data, I still perceive financial reporting in the same way as before”*.

Many students highlighted the challenges that they initially encountered with the assessment in that they *“didn’t know exactly what was meant [by] with a digital creative output”* and were operating *“outside [their] comfort zone[s]”* resulting in *“substantial amount[sic] of struggles in coming up with proper ideas”*. For most this initial apprehension subsided and *“became a learning experience”*. *“It was hard at first, but I learned a lot this way”* and *“after working on it for a while it started becoming easier”*.

While many students found the project to be *“very relatable as it was digital so we had a lot of ideas, because we live on the net”*, many others commented that they *“lack technological knowledge”* and *“I don’t enjoy using IT”*. This divide in opinion may be indicative of the digital divide present in South African society where only 56,3% of South Africans were internet users during 2020 (Statista 2020). Additionally, although the students were referred to the SAMR model for the required level of digital integration as part of the assessment instructions, numerous students requested that *“more guidance as to the kinds of digital outputs that one could use [should be given]”*.

There were again two distinct cohorts amongst the students with regards to the perception of the creativity aspect of this assessment. On the one hand, students embraced the project as *“it is essential to think creatively in an ever-changing business world and come up with creative and effective solutions to problems”*. *“It was more fun for me, since creativity could take charge in a place where logic and numbers usually reign. It was refreshing and a very welcome task”*. Conversely, true to the perceived stereotypical nature of accountants, other students *“did not like being creative or having to think of creative things”*. Some students *“didn’t like how open minded the assignment was...as “creative” is very subjective”*. This may be symptomatic of the accounting profession, in some instances, remaining the career choice of the ‘wrong type of student’, as a consequence of their misperception of the profession (McDowall and Jackling 2010).

The ingrained fixation of the students with pass rates in the high stakes summative assessments typical of the accounting profession (Wilson 2011; Coetzee and Schmulian 2012) was also evident in comments such as *“we can rather spend time doing more questions and to better under[s]tand the work we are currently doing and writing exams on!”*. Lastly, while a few students appreciated *“how much freedom [they] had with regards to what [they] think will be relevant to the users of financial statements”* and *“felt less restricted and didn’t feel any fear of being wrong”*, many students did request *“more guidelines on the content of the output”* and *“examples of outputs and information that could be included”* to assist them initially.

Despite these concerns, the majority of the students’ experiences of the digital creative authentic assessment was positive and was succinctly summarised by a student as follows:

“In the beginning, it was quite hard to figure out how information about an entity’s financial statements could be creatively displayed on a digital platform, but once our team figured out how we could do it, it was quite fun and interesting to develop this digital platform that contains relevant and faithful information. It helped me to identify information that I thought to be faithful and relevant and it also gave me a deeper insight about how all the standards intertwine with one another. I did not just see the [financial reporting] standards as separate standards that deals with topics separately, but I identified standards that ‘work’ together to provide the relevant and faithful information. For me, the experience was insightful and fun”.

2.7 CONCLUSION

The 21st century workplace requires accounting professionals to be creative in their roles as critical thinkers and problem solvers in an increasingly digital environment (Powell et al. 2020). To enable students to develop the necessary digital creativity competence to support them in these roles, this paper reports on the design and development of an authentic assessment, informed by the eight critical design elements of an authentic assessment proposed by Ashford-Rowe, Herrington and Brown (2014).

Although many students were positive about the assessment and found the project to be *“very relatable as it was digital ... because we live on the net”*, the students’ digital creative outputs were mostly simplistic adoptions of traditional office platforms (e.g., *Microsoft PowerPoint*), with links to existing financial information in PDF format. Student attempts at creativity primarily manifested in the visual elements (e.g., Video) included in their outputs. The limited evidence of digital creativity competence in the students’ outputs was not unexpected, given that the accounting profession is not typically associated with creativity, and this was the first assessment in their higher education programme to challenge the students to be digitally creative. Those student teams that did not display a high level of digital creativity need to be provided with additional opportunities to develop their digital creativity competence. Despite the student teams’ outputs mostly being at a low level of digital creativity, many students suggested that they had gained deeper knowledge and understanding of the objective of financial reporting.

It is submitted, based on the analysis of the student teams’ outputs and the students’ perceptions of the assessment, that the assessment met its objective of exposing accounting students to the domain of digital creativity and providing them with an opportunity to develop their digital creativity competence. However, given that only half of the student teams (n=50 of 99) involved in this study were able to display digital creativity at a transformed level, there remains potential to further develop the students’ digital creativity competence. Students could, for example, in future be referred to the resources and links provided by the *University of York’s Digital Creativity Skills Guide* (<https://subjectguides.york.ac.uk/skills/digital-creativity>) (University of York 2019). This guide provides links to various creative prompts and activities. Students could also be

referred to *Digital Creativity* (<http://digitalcreativitytools.everythingability.com>), which provides activities “to help you in getting started creating”, and *Random Digital Creativity Generator* (<https://bit.ly/3Bbzk6Y>), which randomly suggests applications, images, resources and tools that could be combined and used to create digital creative outputs.

It is acknowledged that the generalisability and replicability of students’ perceptions to other institutions may be limited, as this study examined students’ perceptions at a single university. However, this study provides a detailed description of the design and development of the authentic assessment, informed by literature, which can subsequently inform the use of this, or a similar, assessment in other settings. Additional resources which can be consulted by instructors to further the development of their students’ digital creativity are also highlighted. Future multicentre and longitudinal research exploring the actual learning effects and competency development of this, and other interventions targeted on developing students’ digital creativity competence over time, is strongly encouraged.

This research contributes to the authentic assessment and accounting education literature by introducing digital creativity to these domains’ research agenda’s, particularly in contexts not traditionally associated with creativity. The development of authentic assessments, such as the assessment reported in this paper, that move beyond the rote learning of knowledge, play an important role in enabling the development of competencies, such as digital creativity, necessary for success in a rapidly changing 21st century workplace.

2.8 LIST OF REFERENCES

- Abbasi, N. 2013. "Competency approach to accounting education: A global view." *Journal of Finance and Accountancy* 13 (1): 1–18.
- Adie, L. E., L. Hee, and L. Wharton. 2010. "Incorporating authentic assessment into different university learning scenarios." In: *Emerging Trends in Higher Education Learning and Teaching: Proceedings of the TARC International Conference on Learning and Teaching* (pp. 82-90). Tunku Abdul Rahman College.
- Ashford-Rowe, K., J. Herrington, and C. Brown. 2014. "Establishing the Critical Elements that Determine Authentic Assessment." *Assessment & Evaluation in Higher Education* 39 (2): 205–222.
- Baril, C. P., B. M. Cunningham, D. R. Fordham, R. L. Gardner, and S. K. Wolcott. 1998. "Critical Thinking in the Public Accounting Profession: Aptitudes and Attitudes." *Journal of Accounting Education* 16 (3-4): 381–406.
- Birkey, R., and C. Hausserman. 2019. "Inducing Creativity in Accountants' Task Performance: The Effects of Background, Environment, and Feedback." In: *Advances in Accounting Education: Teaching and Curriculum Innovations*. Emerald Publishing Limited.
- Borgonovo, A., B. Friedrich, and M. Wells. 2019. "Competency-Based Accounting Education, Training, and Certification: An Implementation Guide." The World Bank.
- Boud, D. 1990. "Assessment and the Promotion of Academic Values." *Studies in Higher Education* 15 (1): 101–111.
- Boud, D. 2000. "Sustainable Assessment: Rethinking Assessment for the Learning Society." *Studies in Continuing Education* 22 (2): 151–167.
- Boud, D., and N. Falchikov. 2006. "Aligning Assessment with Long-Term Learning." *Assessment & Evaluation in Higher Education* 31 (4): 399–413.

Brown, J. S., A. Collins, and P. Duguid. 1989. "Situated Cognition and the Culture of Learning." *Educational Researcher* 18 (1): 32–42.

Brown, S. 2005. "Assessment for Learning." *Learning and Teaching in Higher Education* 1: 81–89.

Bryant, S. M., D. Stone, and B. Wier. 2011. "An Exploration of Accountants, Accounting Work, and Creativity." *Behavioral Research in Accounting* 23 (1): 45–64.

Carnegie, G. D., and C. J. Napier. 2010. "Traditional Accountants and Business Professionals: Portraying the Accounting Profession after Enron." *Accounting, Organizations and Society* 35 (3): 360–376.

Coetzee, S. A., and A. Schmulian. 2012. "A Critical Analysis of the Pedagogical Approach Employed in an Introductory Course to IFRS." *Issues in Accounting Education* 27 (1): 83–100.

Coetzee, S. A., and A. Schmulian. 2013. "The effect of IFRS adoption on financial reporting pedagogy in South Africa." *Issues in Accounting Education* 28 (2): 243–251.

Cohen, L., L. Manion, and K. Morrison. 2017. *Research Methods in Education*. Routledge.

Collins, A. 1988. "Cognitive Apprenticeship and Instructional Technology." *Technical Report*. No 6899, Cambridge, MA: BBN Labs Inc.

Cooper, S. 2017. "A Collaborative Assessment of Students' Placement Learning." *Assessment & Evaluation in Higher Education* 42 (1): 61–76.

Cumming, J., and G. S. Maxwell. 1999. "Contextualising Authentic Assessment." *Assessment in Education: Principles, Policy and Practice* 6 (2): 177–194.

Deegan, C., and J. Unerman. 2006. *Financial Accounting Theory: European Edition*. Maidenhead: McGraw-Hill.

ECDL Foundation. 2012. "The Role of Digital Proficiency as a 21st Century Competence." Accessed 5 March 2021. <https://bit.ly/3Dkcv3W>

Farrell, C. 2020. "Do International Marketing Simulations Provide an Authentic Assessment of Learning? A Student Perspective." *The International Journal of Management Education* 18 (1): 100362.

Feintzeig, R. 2020. "The Vanishing Executive Assistant." *The Wall Street Journal*. Accessed 5 March 2021. <https://www.wsj.com/articles/the-vanishing-executive-assistant-11579323605>

Forsyth, H., and J. Evans. 2019. "Authentic Assessment for a More Inclusive History." *Higher Education Research and Development* 38 (4): 748–761.

Frank, J. R., L. S. Snell, O. T. Cate, E. S. Holmboe, C. Carraccio, S. R. Swing, ... and R. M. Harden. 2010. "Competency-Based Medical Education: Theory to Practice." *Medical Teacher* 32 (8): 638–645.

Gray, A. 2016. "The 10 Skills You Need to Thrive in the Fourth Industrial Revolution." Accessed 5 March 2021. <https://www.weforum.org/agenda/2016/01/the-10-skills-you-need-to-thrive-in-the-fourth-industrial-revolution>

Greene, J. A., S. B. Yu, and D. Z. Copeland. 2014. "Measuring Critical Components of Digital Literacy and their Relationships with Learning." *Computers & Education* 76: 55–69.

Gulikers, J. T., T. J. Bastiaens, and P. A. Kirschner. 2004. "A Five-Dimensional Framework for Authentic Assessment." *Educational Technology Research and Development* 52 (3): 67.

Gulikers, J. T., T. J. Bastiaens, and P. A. Kirschner. 2006. "Authentic Assessment, Student and Teacher Perceptions: The Practical Value of the Five-Dimensional Framework." *Journal of Vocational Education and Training* 58 (3): 337–357.

Gulikers, J. T., L. Kester, P. A. Kirschner, and T. J. Bastiaens. 2008. "The Effect of Practical Experience on Perceptions of Assessment Authenticity, Study Approach, and Learning Outcomes." *Learning and Instruction* 18 (2): 172–186.

Hamilton, E. R., J. M. Rosenberg, and M. Akcaoglu. 2016. "The Substitution Augmentation Modification Redefinition (SAMR) Model: A Critical Review and Suggestions for its Use." *TechTrends* 60 (5): 433–441.

Harris P., L. Snell, M. Talbot, R. M. Harden, and International CBME Collaborators. 2010. "Competency-Based Medical Education: Implications for Undergraduate Programs." *Medical Teacher* 32 (8): 646–650.

Harris, P., F. Bhanji, M. Topps, S. Ross, S. Lieberman, J. R. Frank, ... and International CBME Collaborators. 2017. "Evolving Concepts of Assessment in a Competency-Based World." *Medical Teacher* 39 (6): 603–608.

Hattie, J. 2012. *Visible learning for teachers: Maximizing impact on learning*. London: Routledge.

Hines, R. D. 1988. "Financial Accounting: in Communicating Reality, We Construct Reality." *Accounting, Organizations and Society* 13 (3): 251–261.

Husserl, E. [1900] 2002. *Logical investigations*. Translated by J.M. Findlay. London: Routledge

International Accounting Standards Board (IASB). 2018. *The Conceptual Framework for Financial Reporting*. London: IFRS Foundation.

James, L. T., and R. Casidy. 2018. "Authentic Assessment in Business Education: its Effects on Student Satisfaction and Promoting Behaviour." *Studies in Higher Education* 43 (3): 401–415.

Jamieson, S. 2004. "Likert Scales: How to (ab) use them?" *Medical Education* 38 (12): 1217–1218.

Krom, C. L., and S. V. Williams. 2011. "Tell Me a Story: Using Creative Writing in Introductory Accounting Courses to Enhance and Assess Student Learning." *Journal of Accounting Education* 29 (4): 234–249.

Larmer, J., J. Mergendoller, and S. Boss. 2015. *Setting the Standard for Project Based Learning*. Alexandria: ASCD.

Lave, J., and E. Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.

Lawson, R. A., E. J. Blocher, P. C. Brewer, G. Cokins, J. E. Sorensen, D. E. Stout, G. L. Sundem, S. K. Wolcott, and M. J. Wouters. 2014. "Focusing Accounting Curricula on Students' Long-Run Careers: Recommendations for an Integrated Competency-Based Framework for Accounting Education." *Issues in Accounting Education* 29 (2): 295–317.

Lee, M. R., and T. T. Chen. 2015. "Digital Creativity: Research Themes and Framework." *Computers in Human Behavior* 42: 12–19.

Maxwell, T. W. 2012. "Assessment in Higher Education in the Professions: Action Research as an Authentic Assessment Task." *Teaching in Higher Education* 17 (6): 686–696.

McDowall, T., and B. Jackling. 2010. "Attitudes towards the accounting profession: an Australian perspective". *Asian Review of Accounting* 18 (1): 30–49.

McGowan, S. 2012. "Going Beyond the Numbers in Teaching Financial Accounting: The Newsletter as an Assignment Option." *Issues in Accounting Education* 27 (4): 1095–1117.

Mladenovic, R. 2000. "An Investigation into Ways of Challenging Introductory Accounting Students' Negative Perceptions of Accounting." *Accounting Education* 9 (2): 135–155.

Osborne, R., E. Dunne, and P. Farrand. 2013. "Integrating Technologies into "Authentic" Assessment Design: An Affordances Approach." *Research in Learning Technology* 21.

Pathways Commission. 2015. "The Pathways Commission: in Pursuit of Accounting's Curricula of the Future." American Accounting Association. Accessed 18 April 2021. <https://aaahq.org/Portals/0/images/education/Pathways/15-9-61866.pdf?ver=2021-02-23-175219-123>

Pinho, K. 2015. "Deloitte to Launch Career Education Program at Cornerstone Schools." Accessed 5 March 2021. <https://bit.ly/3Bc2xPc>

Powell, L., D. Lambert, N. McGuigan, A. Prasad, and J. Lin. 2020. "Fostering Creativity in Audit through Co-Created Role-Play." *Accounting Education* 29 (6): 605–639.

Puccio, G. 2017. "Creativity: A Skill to Cultivate In the 21st Century." Accessed 5 March 2021. <https://www.developintelligence.com/blog/2017/09/creativity-skill-cultivate-21st-century/>

Puentedura, R. 2014. "Building Transformation: An Introduction to the SAMR Model." Accessed 18 April 2021. <https://bit.ly/3U1cCHm>

Rossetto, C., and S. Chapple. 2019. "Creative Accounting? The Critical and Creative Voice of Students." *Assessment & Evaluation in Higher Education* 44 (2): 216–232.

Saemann, G. P., and K. J. Crooker. 1999. "Student Perceptions of the Profession and its Effect on Decisions to Major in Accounting." *Journal of Accounting Education* 17 (1): 1–22.

Schmulian, A., and S. A. Coetzee. 2019. "Students' Experience of Team Assessment with Immediate Feedback in a Large Accounting Class." *Assessment & Evaluation in Higher Education* 44 (4): 516–532.

Schuwirth, L. W., and C. P. Van der Vleuten. 2011. "Programmatic Assessment: From Assessment of Learning to Assessment for Learning." *Medical Teacher* 33 (6): 478–85.

Schwab, K. 2016. "The Fourth Industrial Revolution: What it Means, How to Respond." Accessed 5 March 2021. <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>

Siddiq, F., P. Gochyyev, and M. Wilson. 2017. "Learning in Digital Networks—ICT Literacy: A Novel Assessment of Students' 21st Century Skills." *Computers & Education* 109: 11–37.

Sotiriadou, P., D. Logan, A. Daly, and R. Guest. 2020. "The role of authentic assessment to preserve academic integrity and promote skill development and employability." *Studies in Higher Education* 45 (11): 2132–2148.

Statista. 2020. "Internet User Penetration in South Africa from 2015 to 2025.' Accessed 5 March 2021. <https://www.statista.com/statistics/484933/internet-user-reach-south-africa/>

Strobel, J., J. Wang, N. R. Weber, and M. Dyehouse. 2013. "The Role of Authenticity in Design-Based Learning Environments: The Case of Engineering Education." *Computers & Education* 64: 143–152.

Sullivan, G. M., and A. R. Artino Jr. 2013. "Analyzing and Interpreting Data from Likert-Type Scales." *Journal of Graduate Medical Education* 5 (4): 541–542.

Tan, L. M., and F. Laswad. 2018. "Professional Skills Required of Accountants: what do Job Advertisements Tell Us?" *Accounting Education* 27 (4): 403–432.

To, J., and D. Carless. 2016. "Making Productive Use of Exemplars: Peer Discussion and Teacher Guidance for Positive Transfer of Strategies." *Journal of Further and Higher Education* 40 (6): 746–764.

Tuckman, B.W. 1965. "Developmental Sequence in Small Groups." *Psychological Bulletin* 63 (6): 384–399.

University of York. 2019. "Digital Creativity." Accessed 5 March 2021. <https://subjectguides.york.ac.uk/skills/digital-creativity>

- Van der Mescht, H. 2004. "Phenomenology in Education: A Case Study in Educational Leadership." *Indo-Pacific Journal of Phenomenology* 4 (1): 1–16.
- Van der Vleuten, C. P., and L. W. Schuwirth. 2005. "Assessing Professional Competence: from Methods to Programmes." *Medical Education* 39 (3): 309–317.
- Van Laar, E., A. J. Van Deursen, J. A. Van Dijk, and J. De Haan. 2017. "The Relation between 21st-Century Skills and Digital Skills: A Systematic Literature Review." *Computers in Human Behavior* 72: 577–588.
- Venter, E. R., and C. De Villiers. 2013. "The Accounting Profession's Influence on Academe: South African Evidence." *Accounting, Auditing and Accountability Journal* 26 (8): 1246–1278.
- Villarroel, V., S. Bloxham, D. Bruna, C. Bruna, and C. Herrera-Seda. 2018. "Authentic Assessment: Creating a Blueprint for Course Design." *Assessment & Evaluation in Higher Education* 43 (5): 840–854.
- Villarroel, V., D. Boud, S. Bloxham, D. Bruna, and C. Bruna. 2020. "Using Principles of Authentic Assessment to Redesign Written Examinations and Tests." *Innovations in Education and Teaching International* 57 (1): 38–49.
- Vos, L. 2015. "Simulation Games in Business and Marketing Education: How Educators Assess Student Learning from Simulations." *The International Journal of Management Education* 13 (1): 57–74.
- Vygotsky, L. S. 1978. *Mind in Society: The Development of Higher Psychological Processes*, edited by M. Cole, V. John-Steiner, V. Scribner, and S.E. Souberman. Cambridge, MA: Harvard University Press.
- Wiewiora, A., and A. Kowalkiewicz. 2019. "The Role of Authentic Assessment in Developing Authentic Leadership Identity and Competencies." *Assessment & Evaluation in Higher Education* 44 (3): 415–430.

Wilson, R. M. 2011. "Alignment in Accounting Education and Training." *Accounting Education* 20 (1): 3–16.

World Economic Forum. 2018. "The Future of Jobs Report 2018." Accessed 5 March 2021.
http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf

3 CHAPTER 3: TALKING DURING A TEST?! EMBRACING MOBILE INSTANT MESSAGING DURING ASSESSMENT

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3.1 INTRODUCTION

The emergence of competencies, as outcome indicators of the education process, has been accompanied by calls for the nature of assessment to expand beyond the traditional measurement and validation of individual students' knowledge (Boud 1990; Schuwirth and Van der Vleuten 2020). Assessment should now also incorporate elements of 'assessment for learning' and the development of competencies (Schuwirth and Van der Vleuten 2011; Van der Vleuten 2015; Broadbent, Panadero and Boud 2018).

Collaborative problem solving is an example of a competence that instructors need to consider incorporating in their assessments (Tabary 2015; Yuan and Wu 2020). Collaborative problem solving, or the ability to solve problems through interacting with a group of individuals, is a widely sought after 21st century skill by employers (Care, Scoular and Griffin 2016; Organization for Economic Cooperation and Development (OECD) 2017; Fiore, Graesser and Greiff 2018; Mehrabi Boshraadi and Hosseini 2021).

The inclusion of collaborative problem solving in an assessment need not be at the expense of the construction of knowledge, as collaboration among students in solving problems may result in collaborative learning (Van Boxtel, Van der Linden and Kanselaar 2000). Grounded in social constructivism (Vygotsky 1978), collaborative learning refers to instances where two or more students learn through communicating with each other (Saab, Van Joolingen and Van Hout-Wolters 2005; Jang et al. 2017; Wilson, Ho and Brookes 2018) or the instructor (Kukulska-Hulme and Viberg 2018). Through asking questions and explaining their understanding of the course content in collaborating while solving a problem, students verbalize their thoughts, planning, analysis and decision-making, and internalize these in the elaborative manner necessary for learning (Saab, Van Joolingen and Van Hout-Wolters

2005; Tullis and Goldstone 2020). Consequently, through communicating with each other, students construct their knowledge (McLoughlin and Luca 2002), improve their academic performance (Opdecam et al. 2014; Jang et al. 2017), obtain greater understanding of concepts and develop various competencies (Damon and Phelps, 1989; Jang et al. 2017).

During 2020, the world witnessed a historic shift in the job market due to the Covid-19 pandemic (Castrillon 2020). Working remotely became the norm for most businesses (Castrillon 2020; Choudhury 2020) and collaborative problem solving was increasingly facilitated by embracing mobile technologies, such as Mobile Instant Messaging (MIM). Therefore, to authentically reflect the practice of the discipline being assessed, and to facilitate collaborative learning, it is submitted that students should be enabled to collaborate while solving a problem during assessments using mobile technologies, such as MIM. There appears to be no research into the use of MIM by students for collaborative learning and problem solving while being assessed individually. This study, therefore, reports on the incorporation of MIM in assessments, in a competency-based learning environment, to enable students to authentically communicate.

3.2 LITERATURE REVIEW

Collaborative learning “involves groups of learners working together to solve a problem, complete a task, or create a product” (Rodríguez, Riaza and Gómez 2017, 665). It is not only intended to refer to students learning in groups but also to a student learning from another student or instructor (Kukulska-Hulme and Viberg 2018). As a component of collaborative learning, educational researchers and curriculum designers acknowledge the importance of communication for learning, because communication enables students to actively participate in a social process of knowledge construction (Han and Ellis 2019). When communicating in learning or solving problems together, students first have to organise their existing knowledge (Wegerif and Mercer 1996) and establish common ground between themselves (Tullis and Goldstone 2020). Communicative activities that support organising knowledge and establishing common ground, include informative activities, such as issuing statements, elicitative activities, such as asking questions, and responsive activities, such as answering questions (Saab, Van Joolingen and Van Hout-Wolters 2005). Once existing knowledge has been organised and common ground established, the nature

of the communication necessary to extend existing knowledge and to solve a problem must advance to argumentative activities, such as exchanging of existing ideas, new ideas and conjectures (Wegerif and Mercer 1996; Saab, Van Joolingen and Van Hout-Wolters 2005; Tullis and Goldstone 2020).

The focus on collaborative learning activities has drawn attention to the potential of incorporating these activities into assessment (Rieger and Heiner 2014; Jang et al. 2017). However, collaboration during assessment has historically been considered as cheating, particularly when the purpose of assessment is the measurement and validation of individual students' knowledge (Jang et al. 2017). While the measurement and validation of individual students' knowledge may remain important for professional licencing examinations, in educational settings, assessment for learning should take priority over assessment of learning (Schuwirth and Van der Vleuten 2011) and by incorporating collaborative learning into the assessment environment, students are enabled to learn during assessments (Jang et al. 2017).

MIM, such as *WeChat*, *WhatsApp*, and *Facebook Messenger*, can facilitate the communications necessary for both collaborative learning (Kim, Lee and Kim 2014; Bere 2018; Kukulska-Hulme and Viberg 2018) and collaborative problem solving (Conde et al. 2020). Despite MIM having the potential to support effective collaborative learning (Fattah 2015; So 2016; Sun et al. 2018; Li, Gao and Guo 2020; Yuan and Wu 2020), the literature recognises that the educational use of MIM has only been studied to a limited extent (Rambe and Bere 2013; Jantjies and Joy 2015; So 2016; Tang and Hew 2017; Bere 2018; Pimmer and Rambe 2018); encouraging further research to create a better understanding thereof and its application in education (Pimmer et al. 2019). Given the absence of research exploring the use of MIM to facilitate authentic communication between students during assessment, the following Research Questions are raised:

RQ 1: What is the extent and timing of students' use of MIM to communicate with other students while being assessed individually?

RQ 2: What communicative activities are evident in the content of students' MIM communications while being assessed individually?

RQ 3: How do students experience being able to use MIM while being assessed individually?

3.3 METHOD

3.3.1 Target population and teaching environment

The target population for this study comprised of intermediate accounting students (N=448) enrolled for an introductory financial reporting course. As part of this course's 'programme of assessments' (see Schuwirth and Van der Vleuten 2011) the students are exposed to no stakes, low stakes and high stakes assessments. Traditionally, most of the high stakes assessments are administered in an invigilated face-to-face, pen-and-paper environment. However, due to the COVID-19 pandemic, assessments were administered in an online environment. These assessments remained in pen-and-paper format, but students sat for the assessments off-campus and were required to scan and submit their answers online. As was the case with on-campus assessments, the students were authorised to consult *The Annotated International Financial Reporting Standards* during the assessments, as their main technical resource.

The integrity of high stakes online assessments has, however, presented a challenge for instructors and universities (Daffin and Jones 2018; Butler-Henderson and Crawford 2020). To heighten the integrity of these assessments, collusion and communication among students by using commercial MIM applications during assessments is, generally, not permitted by the institution, particularly during high stakes individual assessments. The enforcement of this rule is, however, cumbersome. To heighten the validity and integrity of these online assessments and prevent students from communicating with each other using commercial MIM applications, certain strategies were implemented. All high stakes summative assessments are timed to afford all students the same amount of time (Gehring and Peddycord III 2013) and to limit the chance to consult prohibited resources and unauthorised communication and consultation among students. An ethics declaration (Christie 2003; Milliron and Sandoe 2008; Daffin and Jones 2018) is used to remind students to behave ethically at all times. Difficulty levels are increased and more authentic scenarios are used in the assessments so that it does not merely test the recollection of facts (Williams and Wong 2009; Daffin and Jones 2018) but rather require the demonstration of a deeper understanding of the subject (Entwistle 2009). The instructors on the course, with many years of teaching experience, discuss various aspects pertaining to the assessments,

including difficulty levels, content, nature, format and timing in order to reach consensus on the suitability thereof. Further, the instructors view the students through the lens of responsible stakeholders (Boud 1990).

3.3.2 Exploring students' MIM communications (RQ 1 and 2)

In response to Research Question 1, the extent and timing of the students' use of MIM during various assessments were explored through descriptive analysis of the number and timing of messages sent. In response to Research Question 2, the content of the student MIM communications were analysed deductively at both semantic and interpretative levels and categorised based on the communicative activities evident in collaborative learning (Table 3-1) (Saab, Van Joolingen and Van Hout-Wolters 2005). These categories are not mutually exclusive, as a message may be categorised into more than one category. The process of analysis was repeated at a later point in time. Variances between the initial and subsequent analysis were then resolved through discussion with the other two instructors on the course to reach mutual consensus.

Table 3-1: Communicative activities with examples

Communicative activities	Examples
Informative	'I think the answer is three'
Argumentative	'Because we did it the other time also like this'
Evaluative	'That's really good!'
Elicitative	'What do you think about this question?'
Verification (checking)	'Do you also think it is 4?'
Critical (checking)	'Do you really think that?'
Responsive	Answer to a question
Confirmation/Acceptance	'Yes, I agree'
Directive	'Try the other one'
Off task	'Yesterday I went to the beach'
Off task technical	'Can you move the upper window, please'

Source: Saab, Van Joolingen and Van Hout-Wolters 2005

To enable the analysis of the extent, timing and content of the student MIM communications during assessments, a dedicated Instant Messaging Assessment Tool (IMAT) was developed and implemented. The IMAT was designed to facilitate the communication necessary for collaborative learning and problem solving, by replicating the communication

functionality of commercial MIM applications. By being independent of these applications, the students could, however, communicate free of the distraction of non-education related messages (Junco and Cotten 2011).

During all of the assessments where the IMAT was used, the students' communications could be observed and monitored in real time by the instructors, as communications on the IMAT were visible to all instructors and students logged into the IMAT. These observations served as a source of diagnostic information of the students' learning, as the students' thoughts were made more visible to the instructors, through the messages they sent using the platform. Transcripts of MIM communications during the assessments could also be downloaded or printed for inclusion in the students' portfolios, as evidence of their development of collaborative problem solving competence. The use of a self-developed MIM platform also avoided the privacy issues plaguing commercial MIM applications (Steigrad 2021).

Before implementing the IMAT during assessments, the students were given an opportunity to familiarise themselves with the functionalities thereof and they were enabled to engage with these functionalities by, for example, posting messages in a practice scenario. The students were also given instructions on how to use the tool and informed of the purpose behind developing and implementing it during assessments.

A description of the development and implementation of the IMAT are included in Appendix A and an open-access template of the IMAT is available at:

<https://bubble.io/template/imat-1619271937738x182102511570386940?exp=1>.

3.3.3 Data collection

The use of a self-developed MIM platform gave the instructors, as developers, access to transcripts of the messages sent during each assessment as the data source for purposes of this study. Following institutional review board approval, data were collected during the following assessments of differing type and stake:

- no stakes essay style assessment;
- no stakes accounting calculation style assessment;

- low stakes essay style assessment;
- low stakes multiple-choice style assessment;
- low stakes accounting journal style assessment; and
- high stakes essay style assessment.

The essay style assessments required the students to discuss the accounting treatment for authentic real-world economic events. The multiple-choice style assessment served as revision of specific basic accounting concepts, as preparation for class. The calculation and journal style assessments were focused on accounting concepts that the students were required to apply in preparing accounting calculations and journal entries. Students were not required to submit their answers for grading for the no stakes assessments but were required to submit, for grading, their own individual answers for the low and high stakes assessments.

The high stakes assessment comprised of two stages. During the first stage, an authentic real-world scenario was provided to the students, without providing the required questions to be answered – unlike the other assessments where the scenario and required questions were immediately provided. The purpose of this decision was to allow the students time for reading and discussion without the pressure of documenting answers for submission. In the second stage, the students received the required questions to answer. An authentic scenario was used to avoid testing the recollection of facts (Daffin and Jones 2018), and instead required the demonstration of a deeper understanding of the subject (Entwistle 2009). Based on professional judgement and observations of the no and low stakes assessments, the instructors carefully considered the time made available for the students for MIM communication during both stages of the high stakes assessment.

3.3.4 Students' experiences (RQ 3)

As active and responsible stakeholders in the assessment process (Boud 1990) the students' experiences of being able to use MIM during their assessments, were explored through an online survey. Quantitative data were generated from a question using a scaled Likert-attitude response (1 – extremely negative to 7 – extremely positive) and a number of Yes/No response questions. Qualitative data were collected through open ended questions. The survey included items by Schmulian and Coetzee (2019), who explored a collaborative

assessment for learning, and items by Feiden (2015), who explored the use of a social annotation platform. These items were modified to reflect the focus of this study. To establish content validity of the survey instrument (McKenzie et al. 1999), two accounting education experts reviewed the survey instrument. Each expert considered the extent to which the items addressed the construct of interest. Suggested additions and/or deletions from the list of items, and recommended changes to ensure clarity of all the items, were incorporated into the survey instrument. As existing survey items were used, minimal changes were made as a result of this review.

The survey instrument was delivered online through *Google Forms*, following institutional review board approval. To maximise the response to the survey (Phillips, Reddy and Durning 2016), the students were pre-notified that the survey would be made available to them and three reminders were sent. 164 students responded to the survey, exceeding the minimum number of respondents (50 – 75 students) necessary to achieve reasonable population estimates in populations smaller than 500 students (Fosnacht et al. 2017).

The quantitative data collected were analysed using *Microsoft Excel* (2021). An initial data integrity check was performed and descriptive statistics were calculated. The qualitative data collected were initially analysed through a content analysis (Cooper 2017) of the reflections provided by the students, coded for analysis using *NVivo 12*.

3.4 RESULTS AND DISCUSSION

3.4.1 Exploring students' MIM communications (RQ 1 and 2)

3.4.1.1 *Extent and timing (RQ 1)*

The percentage of students that elected to use MIM during the assessments (users) ranged between 40% and 71% (Table 3-2). The assessments with the highest percentage of users, were the essay style low stakes (n=282, 71%) and high stakes assessments (n=277, 64%). The low stakes accounting journal style assessment (n=194, 47%) and the no stakes accounting calculation style assessment (n=179, 40%) had the lowest percentage of users (Table 3-2). Not all the users sent messages during the assessments (range: 11% – 40% of

the users) (Table 3-2). Many users may have had their question, comment, or response pre-empted and/or they may have viewed the communications purely as an additional source of information during the assessments.

The no stakes assessments had the highest percentage of users sending messages (37% and 40%) and the most messages sent (n=253 and n=174) (Table 3-2). A decline in both the percentage of users sending messages and the number of messages sent, was evident when the stakes were elevated from no stakes to either low or high stakes (Table 3-2). The two stages of the high stakes assessment yielded two of the lowest percentages of users sending messages – 12% and 17%, respectively – despite the instructors allowing time for communication during both stages of this assessment. Further, during most of the assessments, the number of messages sent over time declined (Figure 3-1), except during the no stakes assessments (n=2), where the number of messages increased until the 15-29th and 30-44th minute periods.

Table 3-2: Students' use of MIM during assessments

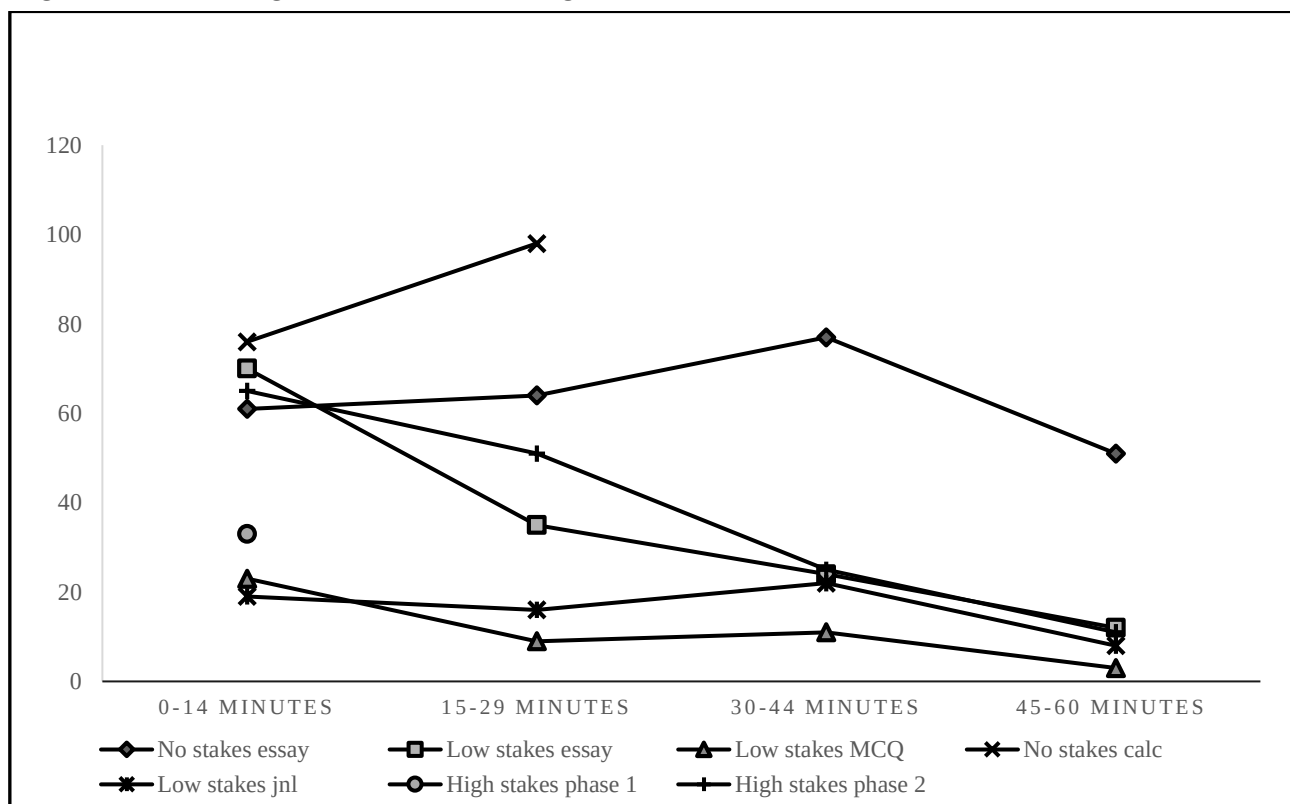
ASSESSMENT	Total population*	MIM Users	Users as % of total population	Duration of assessment	Number of messages	Number of Users sending messages	% of Users sending messages
	N	n		minutes	n	n	
NO STAKES							
Essay	448	260	58%	60	253	96	37%
Accounting calculation	448	179	40%	30	174	71	40%
LOW STAKES							
Essay	398	282	71%	60	141	62	22%
Multiple-choice	422	225	53%	60	46	24	11%
Accounting journal	412	194	47%	60	65	24	12%
HIGH STAKES							
Essay - Stage 1	433	277	64%	15	64	33	12%
Essay - Stage 2	433	277	64%	60	152	48	17%

* For the no stakes assessments, where the students were not required to submit an answer, the total population represents all the students registered for the course. For the low and high stakes assessments, where the students were required to submit answers, the total population represents the number of students that submitted an answer for the assessment.

The decline in the number of messages, number of users sending messages and messages sent over time, may be due to the users' perception of having less time for communication in the low and high stakes assessments, as they were required to submit their answers for grading and, therefore, might have focussed more on clearly documenting their answers.

The low stakes multiple-choice style assessment had the least number of messages (n=46) and the lowest percentage of users sending messages (11%) (Table 3-2). However, the low stakes essay style assessment, of identical duration, yielded many more messages (n=141) and a higher percentage of users sending messages (22%). It is, therefore, submitted that essay style assessments provide greater opportunity for discussion, resulting in the higher percentage of users sending messages and higher number of messages sent. Although less messages were sent during the low stakes multiple-choice style and accounting journal style assessments, those messages were spread more evenly over the duration of the assessments (Figure 3-1). This suggests that the type of assessments may affect the extent and timing of the users' MIM communications. The accounting journal style and multiple-choice style assessments consistently engaged the users with new challenges throughout the assessment as they developed each journal entry or responded to each multiple-choice question.

Figure 3-1: Timing of student messages



During the first stage of the essay style high stakes assessment, scheduled for 15 minutes, 33 users contributed 64 messages (Table 3-2). As the users did not receive the required

questions during this time, it was anticipated, based on the no and low stakes essay style assessments, that the number of messages sent and the number of users sending messages (12%) would be higher. However, in hindsight, novice learners base their representation and approaches on a problem's literal features, derived from the required questions, as opposed to expert learners, where the status of the unknown is secondary to that of deciding which principles have their conditions of applicability met in the problem (Chi, Feltovich and Glaser 1981). Consequently, the low number of messages during the reading and discussion time may be a consequence of the required questions not being provided. During the second stage of the assessment, where the required questions were available, 152 messages were sent and the participation rate increased to 17% (Table 3-2).

3.4.1.2 Content (RQ 2)

During the assessments, organising their existing knowledge and establishing common ground appears to have been the main function or goal of the student communications (Table 3-3), as many messages sent during the assessments elicited verification of specific questions (n=208; 22%), such as, *“What would be the recognition exemption in IFRS 16, Leases?”* or were responsive to questions (n=223; 23%), with responses such as, *“No, I think leave the specific asset out. We know they’re both assets and that’s all we have to prove for now”*.

Progress towards extending knowledge and collaborative problem solving, was evident in the number of argumentative messages (n=108; 11%), characterised by statements that are supported by a reason, such as, *“I think it is not a liability but rather a[sic] equity, as there is no present obligation to pay the money”*. However, most of the argumentative messages were sent during the essay style questions (n=104 of 108, 96%). The messages sent during the multiple-choice style, and accounting journal style assessments, for example, contained little or no argumentative messages (n=1; n=0) and more messages eliciting verification (n=12; n=23). It is submitted that essay style questions are more suited to argumentative messages as they stimulate discussion and problem solving in the authentic scenarios provided. Argumentative messages were primarily sent during the no stakes essay style assessment (n=79 of 108, 73%). When the stakes are raised, students appeared less argumentative and more inclined to elicit verification of specific questions.

The remainder of the messages were largely informative (n=104, 11%), such as, “*I think it’s a provision*”, or confirmation or acceptance (n=119, 12%) of informative messages or earlier responsive messages, such as “*Yes, I agree*” or “*I also don’t think any of the points affect profit*”. Off task technical messages, such as “*Will we be allowed to use our textbooks during texts[sic] for definitions?*”, or “*Where are we suppose[sic] to submit answers?*” accounted for 10% (n=98) of the total messages. These messages were sent primarily during the high stakes essay style assessment where submission of an answer had the most at stake (n=49). The stakes and type of assessment, therefore, appear to influence the extent, timing and content of the messages.

Table 3-3: Frequencies of communicative activities

	COMMUNICATIVE ACTIVITIES*							
ASSESSMENT	Informative	Argumentative	Elicitive	Elicitive Verification	Responsive	Confirmation/ Acceptance	Directive	Off task technical
NO STAKES								
Essay	26	79	2	66	35	37	1	16
Accounting calculation	38	3	8	32	45	37	3	9
LOW STAKES								
Essay	18	14	3	37	34	15	13	8
Multiple-choice	0	1	1	12	16	4	0	12
Accounting journal	1	0	2	23	31	3	1	4
HIGH STAKES								
Essay - Stage 1	7	0	2	6	28	9	0	12
Essay - Stage 2	14	11	7	32	34	14	5	37
TOTAL (n)**	104	108	25	208	223	119	23	98
% of TOTAL	11%	11%	3%	22%	23%	12%	2%	10%
* The communications did not include any, or very few, evaluative (n=3, 0%) and elicitive critical (n=0, 0%) activities. Off task activities (n=44, 5%) mainly comprised student greetings. These activities are not reported.								
** Communicative activities are not mutually exclusive with some comments categorised under more than one activity.								

3.4.2 Students’ experiences (RQ 3)

3.4.2.1 *Descriptive statistics*

The respondent students’ (N=164) overall experiences of being able to use MIM during assessments were positive ($M=4.57$; $SD=1.40$; Median=5) (Table 3-4). Most respondents

confirmed that they read the messages (n=129, 79%) and wanted to use MIM again during assessments (n=122, 74%).

Table 3-4: Students' experiences of using MIM during assessments

Quantitative survey questions				
Q1. On a scale of 1 (extremely negative) to 7 (extremely positive) rate your overall experience of being enabled to communicate with other students using MIM during an assessment.		M=4.57 (SD=1.40) / Median=5		
		Total (N=164)		
		n	%	
7 (extremely positive)		14	8.54	
6		28	17.07	
5		44	26.83	
4		47	28.66	
3		19	11.59	
2		7	4.27	
1 (extremely negative)		5	3.05	
	Q4. Did you read any of the communication posted in the MIM during the assessments?	Q6. Did you <i>initiate</i> any communication using the MIM during the assessments?	Q8. Did you <i>respond</i> to any communication using the MIM during the assessments?	Q10. Did you adjust / revise your own individual answer based on communication posted in the MIM during the assessments?
Yes	n=129 (79%)	n=46 (28%)	n=68 (41%)	n=74 (45%)
No	n=35 (21%)	n=118 (72%)	n=96 (59%)	n=90 (55%)
	Q12. Did communication posted in the MIM during the assessments, improve your understanding of information provided in the question papers?	Q14. Did communication posted in the MIM during the assessments, improve your understanding of the content assessed?	Q16. Would you want to experience assessments similar to the assessments that enabled student communication using the MIM during assessment, again during your agree?	
Yes	n=107 (65%)	n=93 (57%)	n=122 (74%)	
No	n=57 (35%)	n=71 (43%)	n=42 (26%)	

As not all the users sent messages during the assessments (range: 11% – 40% of users) (Table 3-2), only 28% (n=46) of the respondents indicated that they *initiated* MIM communications, while 41% of the respondents (n=68) *responded* to messages (Table 3-4).

Although not necessarily through sending messages themselves, many respondents indicated that MIM communications improved their understanding of the question (65%; n=107) and/or the content assessed (57%; n=93). 45% (n=74) of the respondents indicated that they adjusted or revised their own individual answer prior to submission as a consequence of the MIM communications (Table 3-4).

3.4.2.2 Qualitative analysis

The qualitative analysis provided deeper insights and understanding of the students' experiences of using MIM during assessments, and confirmed their overall positivity thereto. The **learning opportunity, collaboration and teamwork**, afforded by MIM during the assessments, contributed significantly to the students' positive experience. Being *“able to communicate with other students and obtain a different point of view to my own... enhanced my understanding and knowledge of the work”*. The messages *“provide[d] different manners of approaching the required and enhanced exam technique”* and also offered re-assurance when *“I wanted to see if I was on the right track regarding my thought process”*.

MIM contributed to a sense of **authenticity** of the assessments as *“it is quite nice having a virtual classroom of students working together, solving a problem that will help us engage in a similar problem in a real-world scenario”*. *“It is good practice and beneficial for us to communicate and help each other because I believe in the workplace teamwork and conversing over work will make it a lot easi[e]r and prepare us for working in a team”*.

As many respondent students are not English first language speakers and have vastly different levels of exposure to economic activities as a consequence of their own economic status (Coetzee, Schmulian and Kotze 2014; Jantjies and Joy 2015), MIM allowed students to seek clarification on the meaning of words, or for assistance in understanding the economic event to be accounted for. *“The terminology in the question paper was confusing as English is not my first language”* and the *“difficult language would prevent me from easily understanding the scenario presented”*. The use of MIM during the assessments may, therefore, have improved the accessibility and **equity** of assessment in the diverse student cohort.

A number of reasons were put forth by the students who preferred not to use MIM during the assessments. The primary reason for not using MIM was the perceived time constraints: *“I was afraid that I would waste time typing messages instead of completing the assignment on time”*. Some students prefer to focus on acquiring technical accounting knowledge individually in preparation for their professional examinations (Coetzee and Schmulian 2012) at the expense of developing the competencies needed for practice (Tabary 2015). *“Group work is what we will do in our career[sic] but I will be alone when I write final exams so I have to be dependant[sic] on myself and not others”*. A few students expressed a lack of trust in their classmates and a fear of being confused by them, although acknowledging that *“it encourages you to know your work so well to prevent other students’ comments from confusing you”*.

The earlier observation of the students’ perception of having more time for communication in the no stakes assessment and/or when there is less pressure of having to submit an individual answer (Table 3-2) was corroborated by comments such as *“I feel as if [it] did not work for me during [higher stakes] assessments because it was a distraction. I had to distribute my attention between what other students were saying and the question paper/required. I feel as if [it] is most effective during formative assessments rather than [high stakes] class tests, as formative assessments usually have a longer period in which to submit, therefore, students can communicate with other students at any time and not be rushed to communicate during a short time period”*; and *“this works well for weekly class discussion questions where there is time and not under as much pressure to answer”*. Despite these reservations, the majority of students’ experiences of using MIM during assessments, were positive and *“although it did delay me in answering my question I think having the chat function was really helpful. Students aren’t sharing their answers but rather their thought process which could help others either trigger something that will help them answer the question or help them develop their own thought process to answering questions”*.

3.5 CONCLUSION

The nature of assessments in a competency-based learning environment should expand beyond traditional knowledge testing formats to also include elements of *assessment for*

learning and the development of competencies. Collaborative problem solving has been identified as a much needed and sought-after competence in recent graduates. To enable students to learn and to develop the necessary collaborative problem solving competence, while being assessed individually, this study reports on the use of MIM during assessments of varying type and stakes in a competency-based learning environment.

The results of this study suggest that the students' experiences of being able to use MIM during assessments were largely positive due to the learning opportunities, the authentic collaboration, and the equity, that the introduction of MIM during assessments enabled. An inverse relationship between the stakes and type of assessment and the extent and timing of the messages was identified. The no stakes assessments, for example, were characterised by more users sending messages and more messages being sent than the higher stakes assessments. Furthermore, in terms of the content of the messages, the no stakes assessments and essay style assessments were characterised by more argumentative messages, that are necessary for the extension of knowledge and problem solving, than the low or high stakes assessments.

Despite the opportunity created by the use of MIM during assessments for students to learn and develop their collaborative problem solving competence, many students did not yet demonstrate communicative activities at a level that extended knowledge or elicited problem solving, regardless of the assessment stakes involved. The students may, therefore, need to be trained in being able to engage in communicative activities conducive to extending knowledge and problem solving, through focused workshops and by providing them with exemplars of the argumentative activities necessary when collaborating for extending knowledge and solving problems.

It is acknowledged that the generalisability of the students' use and perception of being able to use MIM during the assessments reported in this study may be limited, given the exploratory nature of this study at a single university. Future exploration of MIM during assessments in other contexts may, therefore, add external validity to this study. It is also acknowledged that the students may have used other commercial MIM applications that are not permitted by the institution during the assessments, particularly during high stakes individual assessments.

Despite these limitations, this research contributes to the understanding of the use of MIM as a collaborative learning tool during assessment in a competency-based learning environment. Effective implementation of MIM during assessments can assist students in learning authentically and developing the collaborative problem solving competence required for success in the rapidly changing future world of work. Future research might explore the use of MIM in smaller student groups and for in-person assessments, as opposed to online assessments. Also, the impact of initial reading time on student communications is suggested as an area for future research. Further, while this exploratory study reported on self-perceived learning and competency development, future experimental research into actual learning gains and competency development resulting from the use of MIM during assessments, is encouraged.

3.6 LIST OF REFERENCES

- Bere, A. 2018. "Applying an Extended Task-Technology Fit for Establishing Determinants of Mobile Learning: An Instant Messaging Initiative." *Journal of Information Systems Education* 29 (4): 239–252.
- Boud, D. 1990. "Assessment and the Promotion of Academic Values." *Studies in Higher Education* 15 (1): 101–111.
- Broadbent, J., E. Panadero, and D. Boud. 2018. "Implementing Summative Assessment with a Formative Flavour: A Case Study in a Large Class." *Assessment & Evaluation in Higher Education* 43 (2): 307–322.
- Butler-Henderson, K., and J. Crawford. 2020. "A Systematic Review of Online Examinations: A Pedagogical Innovation for Scalable Authentication and Integrity." *Computers & Education*: 104024.
- Care, E., C. Scoular, and P. Griffin. 2016. "Assessment of Collaborative Problem Solving in Education Environments." *Applied Measurement in Education* 29 (4): 250–264.
- Castrillon, C. 2020. "This is the Future of Remote Work in 2021." *Forbes*, December 27. Accessed 29 November 2021. <https://bit.ly/3xfZmoz>
- Chi, M. T., P. J. Feltovich, and R. Glaser. 1981. "Categorization and Representation of Physics Problems by Experts and Novices." *Cognitive Science* 5 (2): 121–152.
- Choudhury, P. 2020. November-December 2020. "Our Work-From-Anywhere-Future." *Business Harvard Review*. Accessed November 29 2021. <https://hbr.org/2020/11/our-work-from-anywhere-future>
- Christie, B. 2003. "Designing Online Courses to Discourage Dishonesty." *Educause Quarterly* 26 (4): 54–58.

Coetzee, S. A., and A. Schmulian. 2012. "A Critical Analysis of the Pedagogical Approach Employed in an Introductory Course to IFRS." *Issues in Accounting Education* 27 (1): 83–100.

Coetzee, S. A., A. Schmulian, and L. Kotze. 2014. "Communication Apprehension of South African Accounting Students: The Effect of Culture and Language." *Issues in Accounting Education* 29 (4): 505–525.

Conde, M. Á., F. J. Rodríguez-Sedano, F. J. Rodríguez-Lera, A. Gutiérrez-Fernández, and Á. M. Guerrero-Higueras. 2020. "Assessing the Individual Acquisition of Teamwork Competence by Exploring Students' Instant Messaging Tools Use: the WhatsApp Case Study." *Universal Access in the Information Society*: 1–10.

Cooper, S. 2017. "A Collaborative Assessment of Students' Placement Learning." *Assessment & Evaluation in Higher Education* 42 (1): 61–76.

Daffin Jr, L. W., and A. A. Jones. 2018. "Comparing Student Performance on Proctored and Non-Proctored Exams in Online Psychology Courses." *Online Learning* 22 (1): 131–145.

Damon, W., and E. Phelps. 1989. "Critical Distinctions among Three Approaches to Peer Education." *International Journal of Educational Research* 13 (1): 9–19.

Entwistle, N. 2009. *Teaching for Understanding at University: Deep Approaches and Distinctive Ways of Thinking*. London, UK: Palgrave Macmillan.

Fattah, S. F. E. S. A. 2015. "The Effectiveness of Using WhatsApp Messenger as One of Mobile Learning Techniques to Develop Students' Writing Skills." *Journal of Education and Practice* 6 (32): 115–127.

Feiden, G. 2015. "Pilot Study Assessing Student Perception of the Collaborative Annotation Platform Open Rev in a Classroom Environment." In: Uppsala Workshop on Pedagogical Research Projects. Uppsala University, Uppsala, Sweden.

- Fiore, S. M., A. Graesser, and S. Greiff. 2018. "Collaborative Problem-Solving Education for the Twenty-First-Century Workforce." *Nature Human Behaviour* 2 (6): 367–369.
- Fosnacht, K., S. Sarraf, E. Howe, and L. K. Peck. 2017. "How Important are High Response Rates for College Surveys?" *The Review of Higher Education* 40 (2): 245–265.
- Gehringer, E. F., and B. W. Peddycord. 2013. "Experience with Online and Open-Web Exams." *Journal of Instructional Research* 2: 10–18.
- Gold, R. L. 1958. "Roles in Sociological Field Observations." *Social Forces* 36 (3): 217–223.
- Han, F., and R. A. Ellis. 2019. "Identifying Consistent Patterns of Quality Learning Discussions in Blended Learning." *The Internet and Higher Education* 40: 12–19.
- Jang, H., N. Lasry, K. Miller, and E. Mazur. 2017. "Collaborative Exams: Cheating? Or Learning?" *American Journal of Physics* 85 (3): 223–227.
- Jantjies, M., and M. Joy. 2015. "Mobile Enhanced Learning in a South African Context." *Journal of Educational Technology & Society* 18 (1): 308–320.
- Junco, R., and S. R. Cotten. 2011. "Perceived Academic Effects of Instant Messaging Use." *Computers & Education* 56 (2): 370–378.
- Kim, H., M. Lee, and M. Kim. 2014. "Effects of Mobile Instant Messaging on Collaborative Learning Processes and Outcomes: The Case of South Korea." *Journal of Educational Technology & Society* 17 (2): 31–42.
- Kukulska-Hulme, A., and O. Viberg. 2018. "Mobile Collaborative Language Learning: State of the Art." *British Journal of Educational Technology* 49 (2): 207–218.
- Li, L., F. Gao, and S. Guo. 2020. "The Effects of Social Messaging on Students' Learning and Intrinsic Motivation in Peer Assessment." *Journal of Computer Assisted Learning* 36 (4): 439–448.

McKenzie, J. F., M. L. Wood, J. E. Kotecki, J. K. Clark, and R. A. Brey. 1999. "Establishing Content Validity: Using Qualitative and Quantitative Steps." *American Journal of Health Behavior* 23 (4): 311–318.

McLoughlin, C., and J. Luca. 2002. "A Learner–Centred Approach to Developing Team Skills through Web–Based Learning and Assessment." *British Journal of Educational Technology* 33 (5): 571–582.

Mehrabi Boshrabadi, A., and M. R. Hosseini. 2021. "Designing Collaborative Problem Solving Assessment Tasks in Engineering: An Evaluative Judgement Perspective." *Assessment & Evaluation in Higher Education* 46 (6): 913–927.

Milliron, V., and K. Sandoe. 2008. "The Net Generation Cheating Challenge." *Innovate: Journal of Online Education* 4 (6): 3.

Opdecam, E., P. Everaert, H. Van Keer, and F. Buysschaert. 2014. "Preferences for Team Learning and Lecture-Based Learning among First-Year Undergraduate Accounting Students." *Research in Higher Education* 55 (4): 400–432.

Organization for Economic Cooperation and Development (OECD). 2017. "PISA 2015 Assessment and Analytical Framework." Accessed 30 November 2021. <http://tiny.cc/accouz>

Phillips, A. W., S. Reddy, and S. J. Durning. 2016. "Improving Response Rates and Evaluating Nonresponse Bias in Surveys: AMEE Guide No. 102." *Medical Teacher* 38 (3): 217–228.

Pimmer, C., and P. Rambe. 2018. "The Inherent Tensions of "Instant Education": A Critical Review of Mobile Instant Messaging." *International Review of Research in Open and Distributed Learning* 19 (5): 217–237.

Pimmer, C., F. Brühlmann, T. D. Odetola, D. O. Oluwasola, O. Dipeolu, and A. J. Ajuwon. 2019. "Facilitating Professional Mobile Learning Communities with Instant Messaging." *Computers & Education* 128: 102–112.

Rambe, P., and A. Bere. 2013. "Using Mobile Instant Messaging to Leverage Learner Participation and Transform Pedagogy at a South African University of Technology." *British Journal of Educational Technology* 44 (4): 544–561.

Rieger, G. W., and C. E. Heiner. 2014. "Examinations that Support Collaborative Learning: The Students' Perspective." *Journal of College Science Teaching* 43 (4): 41–47.

Rodríguez, A. I., B. G. Rianza, and M. C. S. Gómez. 2017. "Collaborative Learning and Mobile Devices: An Educational Experience in Primary Education." *Computers in Human Behavior* 72: 664–677.

Saab, N., W. R. Van Joolingen, and B. H. Van Hout-Wolters. 2005. "Communication in Collaborative Discovery Learning." *British Journal of Educational Psychology* 75 (4): 603–621.

Schmulian, A., and S. A. Coetzee. 2019. "Students' Experience of Team Assessment with Immediate Feedback in a Large Accounting Class." *Assessment & Evaluation in Higher Education* 44 (4): 516–532.

Schuwirth, L. W., and C. P. Van der Vleuten. 2011. "Programmatic Assessment: From Assessment of Learning to Assessment for Learning." *Medical Teacher* 33 (6): 478–85.

Schuwirth, L. W., and C. P. Van der Vleuten. 2020. "A History of Assessment in Medical Education." *Advances in Health Sciences Education* 25 (5): 1045–1056.

So, S. 2016. "Mobile Instant Messaging Support for Teaching and Learning in Higher Education." *The Internet and Higher Education* 31: 32–42.

Steigrad, A. 2021. September 7. "Facebook Reads and Shares WhatsApp Private Messages: Report." *The New York Post*. Accessed 30 September 2021. <https://nypost.com/2021/09/07/facebook-reads-and-shares-whatsapp-private-messages-report/>

Sun, Z., C. H. Lin, M. Wu, J. Zhou, and L. Luo. 2018. "A Tale of Two Communication Tools: Discussion-Forum and Mobile Instant-Messaging Apps in Collaborative Learning." *British Journal of Educational Technology* 49 (2): 248–261.

Tabary, Z. 2015. "The Skills Agenda: Preparing Students for the Future." Economist Impact. Accessed 29 September 2021. <https://perspectives.eiu.com/talent-education/driving-skills-agenda/blog/skills-agenda-preparing-students-future>

Tang, Y., and K. F. Hew. 2017. "Is Mobile Instant Messaging (MIM) Useful in Education? Examining its Technological, Pedagogical, and Social Affordances." *Educational Research Review* 21: 85–104.

Tullis, J. G., and R. L. Goldstone. 2020. "Why does Peer Instruction Benefit Student Learning?" *Cognitive Research: Principles and Implications* 5: 1–12.

Van Boxtel, C., J. Van der Linden, and G. Kanselaar. (2000). "Collaborative Learning Tasks and the Elaboration of Conceptual Knowledge." *Learning and Instruction* 10 (4): 311–330.

Van der Vleuten, C. P. 2015. "Competency-Based Education is Beneficial for Professional Development." *Perspectives on Medical Education* 4 (6): 323–325.

Vygotsky, L. S. 1978. *Mind in Society: The Development of Higher Psychological Processes*, edited by M. Cole, V. John-Steiner, V. Scribner, and S.E. Souberman. Cambridge, MA: Harvard University Press.

Wegerif, R., and N. Mercer. 1996. "Computers and Reasoning through Talk in the Classroom." *Language and Education* 10: 47–64.

Williams, J. B., and A. Wong. 2009. "The Efficacy of Final Examinations: A Comparative Study of Closed-Book, Invigilated Exams and Open-Book, Open-Web Exams." *British Journal of Educational Technology* 40: 227–236.

Wilson, L., S. Ho, and R. H. Brookes. 2018. "Student Perceptions of Teamwork within Assessment Tasks in Undergraduate Science Degrees." *Assessment & Evaluation in Higher Education* 43 (5): 786–799.

Yuan, C. H., and Y. J. Wu. 2020. "Mobile Instant Messaging or Face-to-Face? Group interactions in Cooperative Simulations." *Computers in Human Behavior* 113: 106508.

3.7 APPENDIX A: INITIAL DEVELOPMENT AND POST IMPLEMENTATION REVIEW OF THE IMAT

To inform the discussion of the development of the IMAT, the developers, as ‘complete participants’ (Gold 1958), relied upon their development notes, personal experiences, conversations, and reflections during the development process, both prior to and since the launch of the IMAT.

3.7.1 Initial development

The developers’ initial discussion of the idea to develop the IMAT in December 2020 resulted in the IMATs development as a web application. A web application is an application that runs on a web server, unlike computer-based software that is run locally on a device. Web applications, accessed through a web browser from any device or operating system, have many benefits, including:

- not requiring installation on a hard drive, so there are no space limitations;
- requiring lower technical specifications for the user's device; and
- always being up to date because updates are applied centrally and all users access the same version.

The IMAT was published to the internet on 15 March 2021 as a Minimum Viable Product (MVP). An MVP is a product with enough features to validate an idea early in the development cycle. The MVP helped the instructors receive student feedback as quickly as possible to iterate and improve the IMAT.

Having no coding knowledge, the developers elected to use a no code development tool, *Bubble.io*, to develop the IMAT. *Bubble.io* is a no code web app development tool that offers a range of free and paid plans and has a visual development environment. The visual development environment allows the placing of elements on pages through clicking and dragging and the results of the web app, rather than a screen of code, to be seen (Figures 3-2 and 3-3). Instructions on the use of *Bubble.io* are available at <https://bubble.io/lessons>.

Figure 3-2: Bubble.io development environment

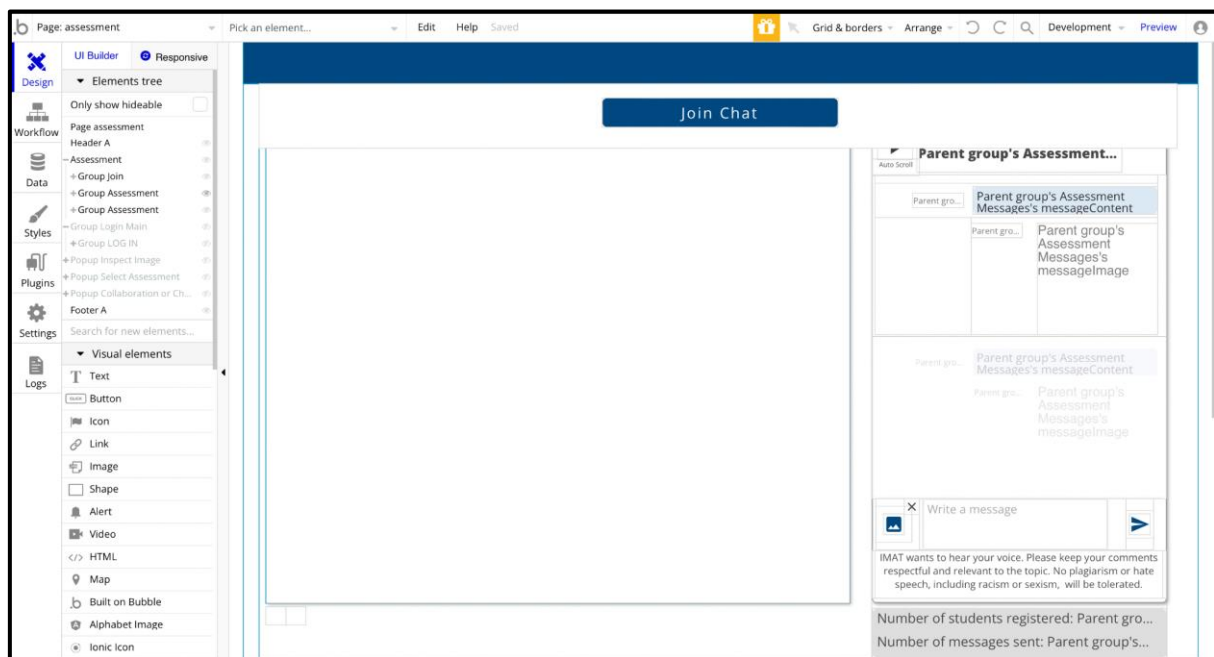
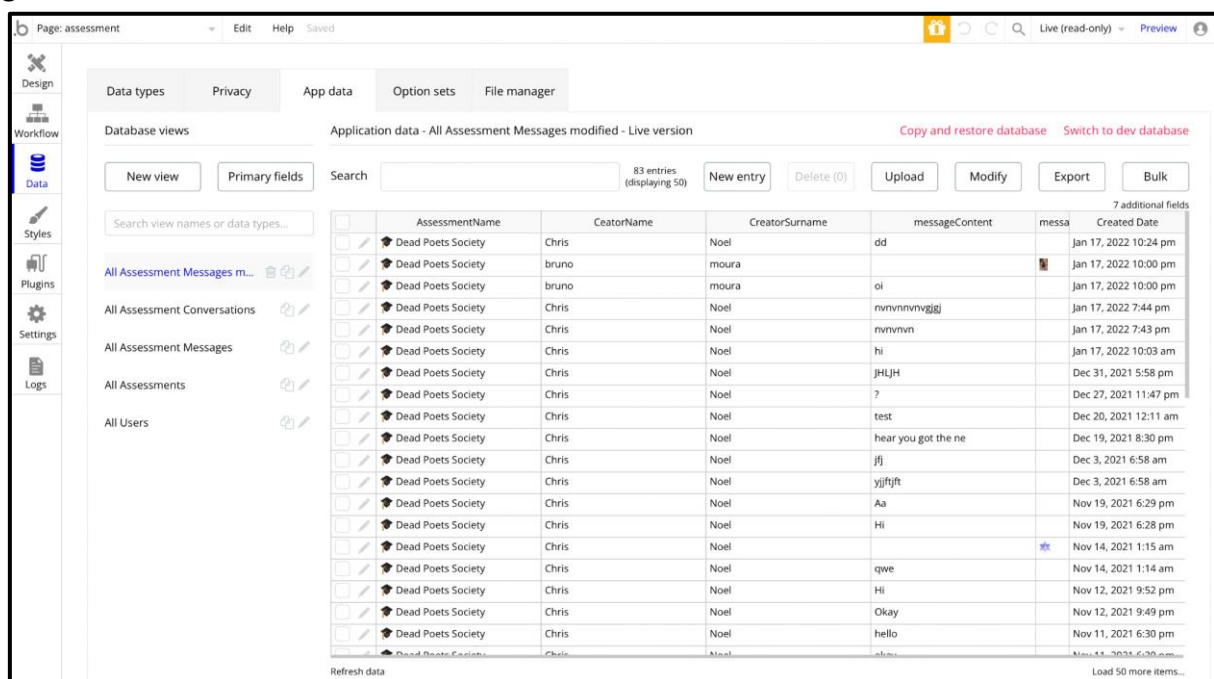


Figure 3-3: Bubble.io database



On a computer, the basic design of the IMAT displays the assessment on the left, the 'chatroom' on the right, and a timer reflecting the assessments' duration at the bottom of the screen (Figure 3-4). On a mobile device, the assessment is viewed first and the chat immediately below it. The timer floats at the bottom of the device's screen, and can be minimised to avoid obstructing the students' view (Figure 3-5).

Figure 3-4: IMAT user view on computer

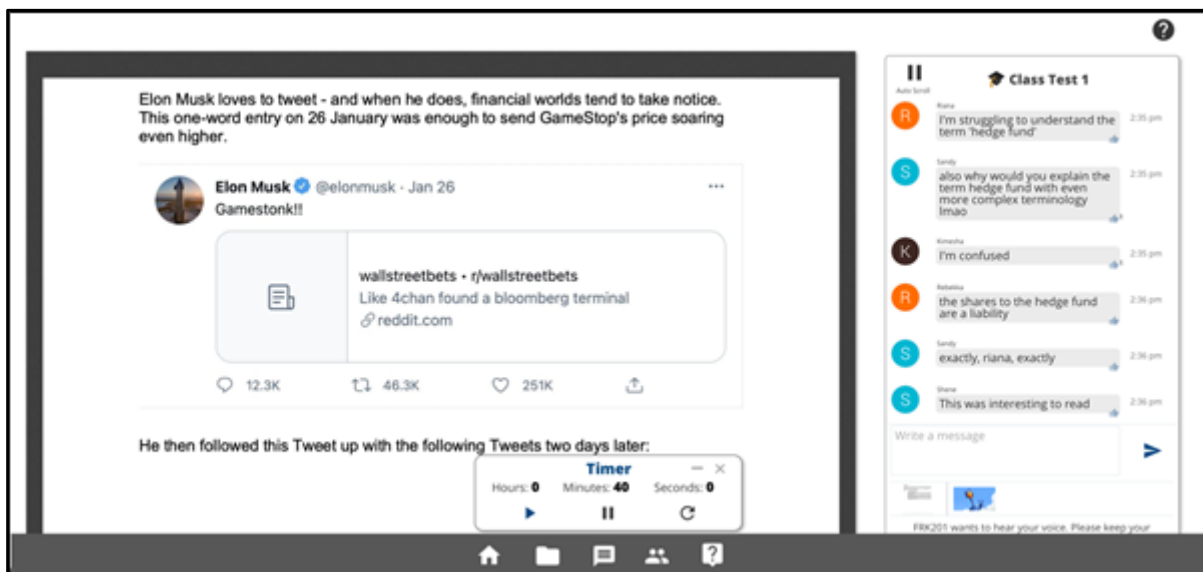
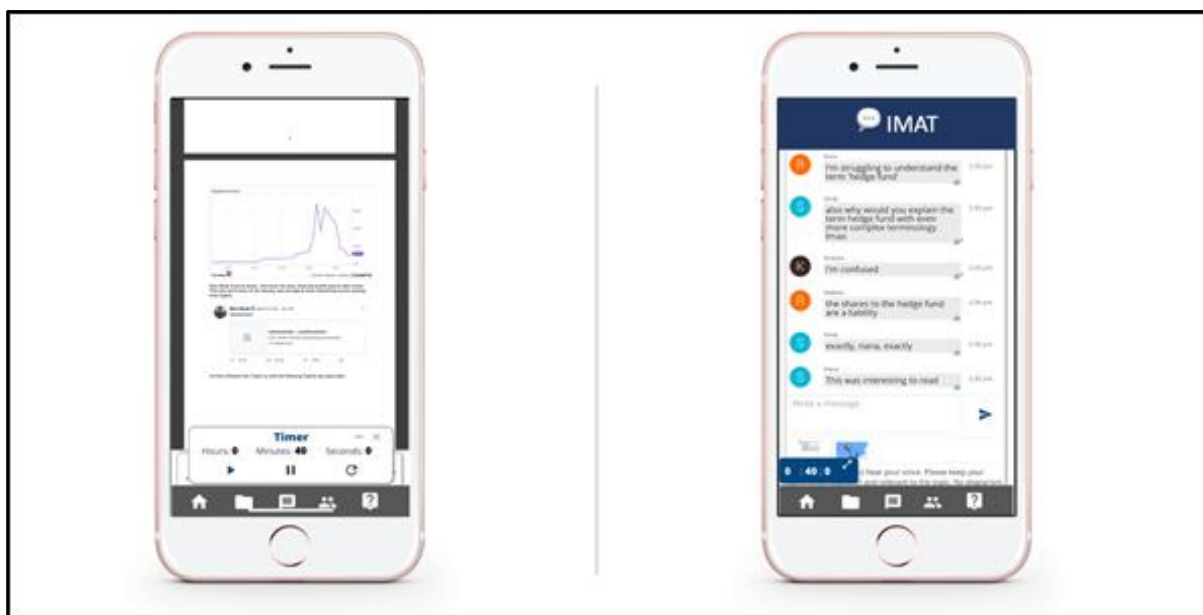


Figure 3-5: IMAT user view on mobile device



3.7.2 Post-implementation review

In reviewing the initial deployment of the IMAT, it was noted that the students were uncertain about what they were 'allowed' to discuss using the IMAT during assessments. Basic guidelines were subsequently included when students log into the IMAT, and under the 'Write a message' text input box (Figure 3-6).

Figure 3-6: Login message and notice under the “Write a message” text input box

The image shows two UI components. The top component is a modal dialog titled "Collaboration or Cheating?". It contains a paragraph of text explaining the difference between collaboration and cheating. Below the text are two buttons: "Disagree" and "Agree". The bottom component is a text input box with the placeholder text "Write a message" and a blue arrow button to its right. Below the input box is a notice: "FRK201 wants to hear your voice. Please keep your comments respectful and relevant to the topic. No plagiarism or hate speech, including racism or sexism, will be tolerated."

Collaboration or Cheating?

I, **Current User's Name Current User's Surname**, agree that when students are working in groups, searching for a solution to a problem, looking through possible answers for the best one, or sorting out material to include in a presentation, that's collaboration. When one student in the group solves the problem and everyone else copies the answer, that's cheating. When one student acts dishonestly and the rest of the group covers, that's cheating.

Write a message

FRK201 wants to hear your voice. Please keep your comments respectful and relevant to the topic. No plagiarism or hate speech, including racism or sexism, will be tolerated.

The students did not make use of the photo upload tool in the initial iteration of the IMAT and this functionality was removed to improve the application's loading and response time. The response time of the initial iteration of the application appeared slow, with noticeable delays in messages appearing on the screen, particularly as the number of messages sent in close succession increased. *Bubble.io* incorporates the ability to temporarily boost an application's server capacity (Figure 3-7). Boosting this capacity at the commencement of the assessment significantly improved the response time of the application during subsequent assessments.

Figure 3-7: Temporary capacity boost on *Bubble.io*

The image shows a notification box titled "Capacity temporary boost". It contains two lines of text: "You can test the benefit of adding capacity to your app up to three times a month." and "You are not using a boost currently. You have used 0 boost over the last month and can do this 3 more times this month." Below the text is a button labeled "Confirm boost!".

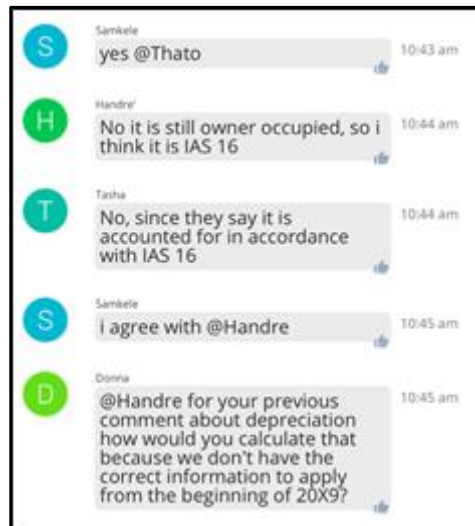
Capacity temporary boost

You can test the benefit of adding capacity to your app up to three times a month.

You are not using a boost currently. You have used 0 boost over the last month and can do this 3 more times this month.

The students used the initial iteration of the IMAT anonymously. However, they indicated that they prefer addressing each other by name in a more natural conversation. Consequently, the sender's first name was included in the IMAT. In a large class, revealing only the sender's first name retained some privacy for the sender (Figure 3-8).

Figure 3-8: Conversation indicating sender's first name



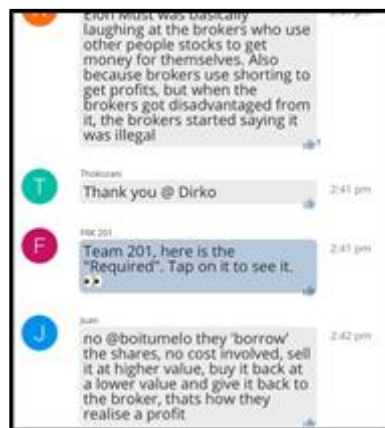
The initial iteration of the IMAT automatically scrolled to the most recent message received. Some students indicated that they would prefer to pause the conversation at times to focus on specific messages, therefore, a pause button was added (Figure 3-9).

Figure 3-9: Auto scroll button



Lastly, the students requested that the instructors' messages, dealing, *inter alia*, with administration or technical support issues, should be highlighted. Consequently, the instructors' messages were displayed in blue and the students' messages in grey (Figure 3-10).

Figure 3-10: Instructor messages in different colours



4 CHAPTER 4: AN ANALYSIS OF STUDENTS' TEXT-BASED INTERACTIONS WHILE COLLABORATIVELY READING AND ANNOTATING FINANCIAL REPORTING STANDARDS

4.1 INTRODUCTION

In the constantly evolving world of work, professionals must continually learn and relearn through lifelong learning (McCloughlin and Luca 2002; Peters and Romero 2019; Schaefer et al. 2019; Lock et al. 2021). In order to learn and to relearn, professionals must know how to gain knowledge from written language (Johnson, Archibald and Tenenbaum 2010; Hilton and Johnstone 2013; Baker 2019; Özdemir and Akyol 2019). In the context of professional accounting, and the financial reporting component thereof in particular, that written language is contained in financial reporting standards, the knowledge of which is a significant component of a professional accountant's required technical competencies (Wilburn and Kilpatrick 2020; South African Institute of Chartered Accountants (SAICA) 2021). Financial reporting standards are dynamic and subject to substantial revision over time (Hilton and Johnstone 2013; International Financial Reporting Standards (IFRS) Foundation 2022a). Professional accountants must, therefore, be able to read, with comprehension, the written language contained in these standards during their studies and throughout their careers (McGowan 2012; Janse van Rensburg, Coetzee and Schmulian 2014; Coetzee, Janse van Rensburg and Schmulian 2016; Baker 2019).

Reading comprehension is affected, *inter alia*, by the readability of the text (Pardo 2004). Financial reporting standards, and International Financial Reporting Standards (IFRS) in particular, are 'difficult' to read (Coetzee, Janse van Rensburg and Schmulian 2016). Financial reporting students should, therefore, be assisted in developing their ability to read, with comprehension, the written language contained in these 'difficult to read' documents (Hilton and Johnstone 2013; Janse van Rensburg, Coetzee and Schmulian 2014; Coetzee, Janse van Rensburg and Schmulian 2016).

The ability to read written language, with comprehension, for lifelong learning, can be developed by engaging students in collaborative reading (Johnson, Archibald and

Tenenbaum 2010; Chen and Chen 2014; Keevy 2015; Chen, Li and Chen 2020; Chen, Chen and Horng 2021). Collaborative reading is a socially contextualised collaborative learning activity where students, as readers, co-construct their comprehension of the written language through text-based interactions, or annotations (Kiili et al. 2012; Chen, Li and Chen 2020). These annotations make the readers' thinking visible to other readers and in so doing encourages the readers to interact with each other and with the text (Chen, Hussein and Poquet 2021). Through this text-based interaction, a deeper understanding of the underlying written language can be obtained by the reader, than through reading without annotations (Porter-O'Donnell 2004; Chen and Chen 2014). Reading with annotations requires readers to pay more attention and to engage in higher-level cognitive processing (Mendenhall and Johnson 2010; Lu and Deng 2013).

Collaborative reading is increasingly supported by computers (Lock et al. 2021). An online social annotation platform (OSAP) is an example of a computer-supported collaborative learning (CSCL) tool that enables students to collaboratively read and annotate written language, and in particular their study material, online (Novak et al. 2012; Gao 2013; Ghadirian, Salehi and Ayub 2018; Chen, Li and Chen 2020; Zhu et al. 2020). Language students, in small experimental conditions, who interacted with their study material, peers, and instructors using OSAPs demonstrated greater improvement in their reading comprehension than those who worked independently on the study material (Chen, Chen and Sun 2010; Johnson, Archibald and Tenenbaum 2010; Mendenhall and Johnson 2010; Yang et al. 2011; Chen and Chen 2014; Chen, Li and Chen 2020; Kalir 2020).

However, in large real-world, non-language classrooms, with limited opportunity for active instructor engagement throughout the collaborative reading process, the fact that students are reading and annotating study material on an OSAP, may not necessarily lead to the collaboration or meaningful discussions with peers necessary to enhance a student's reading comprehension (Kreijns, Kirschner and Jochems 2003; Kalir 2020). For example, without the regular instructor guidance present in the experimental studies, students may post content-related, individual perspectives rather than discussing the study material's key principles, and their understanding of it, with fellow students (Kreijns, Kirschner and Jochems 2003; Miller et al. 2018; De Boer 2020).

Understanding how students behave and interact while collaboratively reading and annotating study material using an OSAP in large classes with limited to no instructor intervention is crucial to determining if the students' use of an OSAP under these circumstances is also conducive to promoting the students' ability to read study material with comprehension (Northrup 2001; Kreijns, Kirschner and Jochems 2003; Murphy 2004; Dillenbourg and Fischer 2007; Gao 2013; Adams and Wilson 2020). The nature of students' interactions with each other when collaboratively reading and annotating study material, as evidence of collaboration has, however, scarcely been studied (Gao 2013). An analysis of the content of annotations could unveil the type of interactions in the discussions (Weinberger and Fischer 2006; Wever et al. 2007; Xie and Ke 2011) and provide rich, detailed, and descriptive insight into the students' use of OSAPs (Olson and Brown 2018).

This study, therefore, explores the nature of the students' text-based interactions with each other when collaboratively reading and annotating the content of a financial reporting standard using an OSAP in a large real-world financial reporting classroom. In addition, this study explores these students' broader experiences of using an OSAP, to obtain deeper insight into factors that may underly the nature of their interactions.

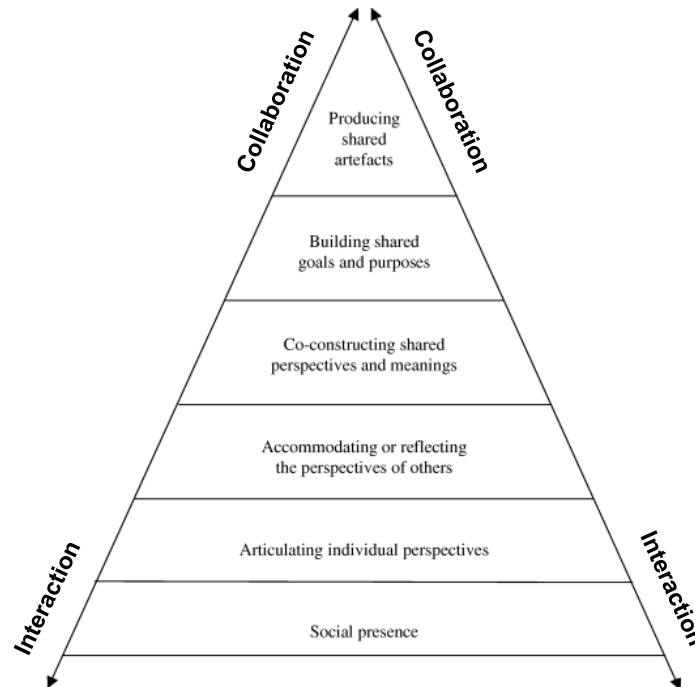
4.2 LITERATURE REVIEW

Interactions in online asynchronous discussions, such as online annotations of a written text, can be conceptualised on a continuum along which six major processes or stages can be identified (Murphy 2004) (Figure 4-1). This framework has proven to be effective for recognising collaboration during asynchronous online discussions (Coutinho and Lisboa 2014; Schaefer et al. 2019; Shan and Wang 2021), but has not yet been used to explore the discussions in an OSAP.

When participating and interacting in asynchronous online discussions, students should first establish social presence within a community of learning (Garrison, Anderson and Archer 2000; Kreijns, Kirschner and Jochems 2003; Adams and Wilson 2020) “show[ing] awareness of each other's presence and begin[ning] to relate as a group” (Murphy 2004, 422). Thereafter, the interaction can progress to the second stage where the students

articulate their own perspectives without referring to the perspectives of others (Murphy 2004).

Figure 4-1: Collaboration model



Source: Murphy 2004

After the students have been exposed to each other's perspectives, they can progress to stage three where they begin to accommodate and reflect on the perspectives of others (Henri 1995; Knuth and Cunningham 1993; Jonassen, Mayes and McAleese 1993). This involves directly or indirectly disagreeing or challenging the statements made by other students as well as introducing new perspectives (Murphy 2004). Once this stage is reached, the interaction can further develop towards the fourth stage of co-constructing shared perspectives and meanings (Alexander 1992; Henri 1995; Schrage 1995; Garrison, Anderson and Archer 2000), which involves, *inter alia*, sharing information and resources, asking for clarification, soliciting feedback, provoking thought and discussion as well as responding to questions (Murphy 2004). Once the students' individual perspectives are challenged and they manage to co-construct shared perspectives and meaning, they should build shared goals and purposes at stage five and ultimately produce a shared artefact at stage six, which indicates a level of complete collaboration (Murphy 2004).

While the earlier processes in the collaboration model are prerequisites for the later ones, simple interaction at the lower levels does not guarantee that the higher levels of collaboration will automatically be reached (Murphy 2004). For example, applications of this collaboration model to analyse interactions during asynchronous online discussion revealed that participants primarily engaged in the processes related to *social presence* and *articulating individual perspectives* (Murphy 2004; Coutinho and Lisboa 2014; Schaefer et al. 2019; Shan and Wang 2021). However, given the paucity of research exploring the nature of students' interactions and level of collaboration when using OSAPs in particular, the following research question is raised:

RQ 1: What is the nature of financial reporting students' text-based interactions with each other, using an OSAP, while collaboratively reading and annotating the content of a financial reporting standard?

To obtain deeper insight into factors that may underly the nature of the students' interactions using an OSAP, it is necessary to also understand the students' broader experiences of using an OSAP. Studies focussing on evaluating students' attitudes and perceptions towards using OSAPs mostly conclude that students have a positive attitude towards OSAPs and that this type of technology facilitated and supported learning (e.g., Nokelainen et al. 2003; Mendenhall and Johnson 2010; Su et al. 2010; Samuel, Kim and Johnson 2011; Zyto et al. 2012; Feiden 2015; Sun and Gao 2017; Olson and Brown 2018; Zhao, Gao and Yang 2018; Woodward and Neunaber 2020). Positive links between the use of OSAPs and student motivation towards learning and reading were also identified (Nokelainen et al. 2003; Razon et al. 2012; Gao 2013; Sun and Gao 2017). The generalisability of these studies exploring students' attitudes and perceptions is, however, often limited by their small sample size (Novak et al. 2012; Ghadirian et al. 2018; Zhu et al. 2020). Further, these studies have not explored the annotation of a technical document, such as financial reporting standards and instead focussed on *inter alia*, research articles (e.g., Walker 2019), research proposals (e.g., Mendenhall and Johnson 2010), study materials, online documents (Novak et al. 2012) and textbooks (Miller et al. 2018). This gives rise to the following research question:

RQ 2: How do financial reporting students experience using an OSAP, while collaboratively reading and annotating a financial reporting standard?

4.3 BACKGROUND

4.3.1 Target population and teaching environment

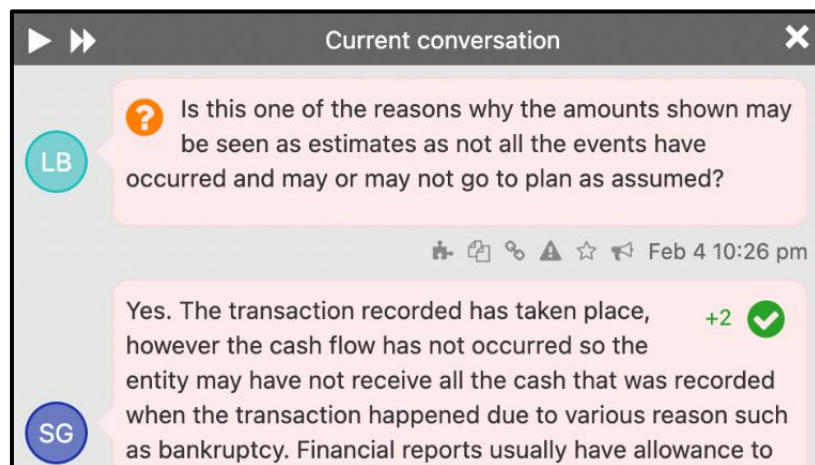
This study involves all second-year, or intermediate level financial reporting students enrolled for an introductory course to IFRS. This course forms part of the undergraduate phase of these students' qualification process towards becoming professional accountants. The students are expected to prepare for class, through participating in pre-class collaborative reading activities of the underlying IFRS. These 'flipped classroom' pre-reading activities shift the transfer of theoretical information outside the classroom and expose the students to the technical content of the course before class to allow for more meaningful in-class discussions (Bergmann and Sams 2012; Tucker 2012; Lento 2016; Miller et al. 2018). Flipped classroom activities support collaborative learning in a social-constructivist learning environment and creates opportunities through which collaborative learning can be more fully utilised (Bergmann and Sams 2012; Tucker 2012; Akçayır and Akçayır 2018). To further construct the students' knowledge, the course's 'programme of assessments' (see Schuwirth and Van der Vleuten 2011) includes collaborative authentic assessments (Janse van Rensburg, Coetzee and Schmulian 2021) and Team Assessments with Immediate Feedback (TAIF) (Schmulian and Coetzee 2019). The students are, therefore, afforded ample collaboration opportunities to socially interact and build a strong community of learning within a social-constructivist learning environment.

4.3.2 Selected OSAP

The pre-class collaborative reading activities are facilitated using *Perusall* (<https://www.perusall.com/>). *Perusall* is an OSAP designed to enable collaboration and promote community development (Clarke 2021; Adams and Wilson 2020; Cecchinato and Foschi 2020), high pre-class reading compliance, engagement, and conceptual understanding (Miller et al. 2018). *Perusall* offers the basic highlighting and annotating functions of an OSAP. However, given that social presence within a strong community of learning is paramount in the process of interactive collaboration in an online collaborative learning environment (Kreijns, Kirschner and Jochems 2003; Murphy 2004; Adam and Wilson 2020), *Perusall* offers additional features designed to enhance the students' social

experience. These features encourage students to interact with fellow students outside of class while reading the same document (Miller et al. 2018). Students are, for example, able to see the *avatars* of other students that are currently online and viewing the same reading assignment. The instructor, however, has the option to set the assignments as fully anonymous. In which case students can only post annotations anonymously, and their avatars will show anonymous avatars in place of the normal avatars that show student photos or initials. Where assignments have not been set as anonymous, the students still have the option to annotate anonymously by clicking the appropriate icon in the toolbar when typing their annotation. In addition, the *upvoting* function in *Perusall* allows students to provide feedback on the annotations made by other students. This function enables the students to indicate that they find a specific comment or explanation helpful (green tick) or that they have the same question as one already posed by another student (orange question mark) (Figure 4-2).

Figure 4-2: Upvoting function in *Perusall*

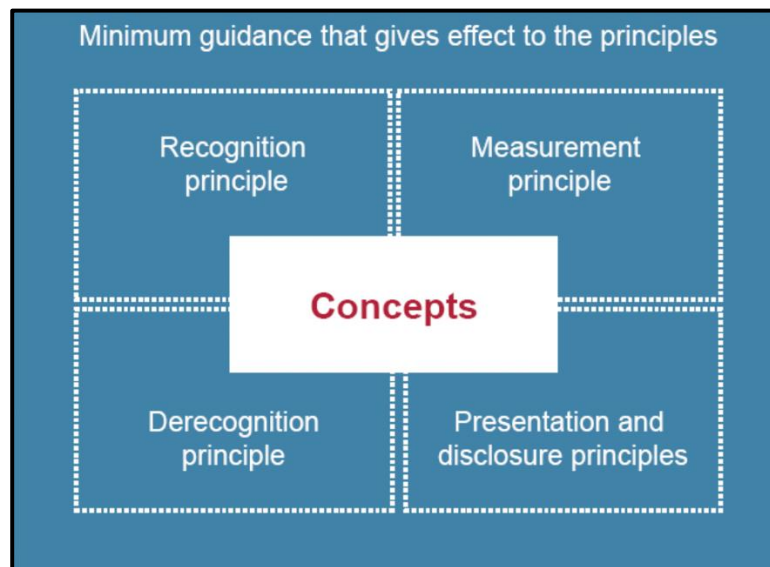


A design feature supporting large classes, in particular, is the automatic *sectioning* by *Perusall* of large student groups into smaller groups, as it has been observed that the overall quality of the students' annotations decreases once the size of the group becomes too large (Miller et al. 2016). In the smaller groups there is less risk of student annotations oversaturating the discussion. Students are also better able to familiarise themselves with their group members, which promotes greater interaction (Miller et al. 2016).

4.3.3 Written text

Given that the targeted student population is studying towards qualifying as professional accountants in a jurisdiction¹ that has fully adopted IFRS, International Financial Reporting Standards forms the basis of their study material. At the centre of IFRS is The Conceptual Framework for Financial Reporting (Framework) (International Accounting Standards Board (IASB) 2018). The Framework establishes underlying concepts from which particular principle-based IFRS requirements are developed (Figure 4-3). Consequently, the instructors have adopted framework-based teaching of principle-based IFRS.

Figure 4-3: Principle-based standard



Source: Coetzee, Janse van Rensburg and Schmulian 2016

Framework-based teaching focuses on relating the underlying concepts in the Framework to a particular IFRS requirement (Barth 2008; Coetzee and Schmulian 2011; 2012; Hodgdon, Hughes and Street 2011; Wells 2011). When students understand these underlying concepts and the relationship with IFRS requirements, they are better able to apply judgement when accounting for economic events (Barth 2008; Hilton and Johnstone 2013). Furthermore, given the infrequent revision of the Framework², students gain a more

¹ More than 160 jurisdictions across the world have adopted or endorsed IFRS (International Financial Reporting Standards (IFRS) Foundation 2022b).

² The International Accounting Standards Board (IASB) issued the revised Framework in March 2018 with the amendments effective for annual periods beginning on or after 1 January 2020 (International Accounting Standards Board (IASB) 2018).

enduring knowledge of financial reporting when they are able to apply conceptual principles when accounting for economic events (Barth 2008), strengthening their ability to learn IFRS as students and to relearn revised IFRS as professional accountants. Consequently, the Framework is adopted as the written text for purposes of this study.

4.4 METHOD

4.4.1 Data collection

The *Perusall* system randomly subdivided the students registered for the course and on *Perusall* (N=495) into smaller sections of 20³ students each. Students were only able to interact and see annotations posted anonymously by others in their respective sections. Each student had to complete the Framework reading assignment in their own time before a specified deadline, using *Perusall*. This assignment required each student to make a minimum of 27 thoughtful online annotations while collaboratively reading the Framework. The required number of annotations was calculated in accordance with the guidelines recommended by the developers of *Perusall* (Miller et al. 2018). An annotation represents any comment made by a student while collaboratively reading the content of the reading assignment. An annotation is either a comment made, a question raised or a reply to another students' comment made or question raised. Making use of the upvoting function mentioned earlier does not represent an annotation. Each pre-class reading assignment was scored by the *Perusall* system's integrated assessment algorithm to encourage students to participate (Cecchinato and Foschi 2020). This algorithm uses timeliness, quantity, quality and distribution as criteria to evaluate each student's set of annotations (For more see Miller et al. 2018). Each reading assignment was scored according to all four of these criteria. As part of the course's 'programme of assessments', these scores were incorporated in the students' portfolio for the course. The due date of the reading assignment, allowing sufficient time for completion, was set for the evening before the face-to-face classroom activities involving the Framework. Transcripts of the student annotations downloaded from *Perusall* served as the data source for this study.

³ The developers of *Perusall* set the default threshold for a section, that should maintain a higher quality of annotations, at 20 students (Miller et al. 2016; 2018).

4.4.2 Nature of students' interactions (RQ 1)

In response to Research Question 1, the nature of the students' text-based interactions while collaboratively reading and annotating the written text of the Framework, using *Perusall*, were analysed deductively at both semantic and interpretative levels. The student annotations were used as the unit of analysis and were categorised based on the six processes or stages of interaction and collaboration evident in the collaboration model developed by Murphy (2004) (Figure 4-1). These stages are not mutually exclusive, since each annotation might contain various indicators evident of more than one stage in the collaboration model. The indicators identified for each stage in the collaboration model as well as examples for each indicator (Murphy 2004) were used as guidance to classify each student annotation. The process of analysis was repeated at a later point in time. Variances between the initial and subsequent analysis were then resolved through discussion with the other two instructors on the course to reach mutual consensus. Transcripts of the students' annotations on the *Perusall* system clearly indicate with an arrow when an annotation was in reply to another student's comment or question (Figure 4-4). This functionality of the *Perusall* system supported the analysis of the student annotations.

Figure 4-4: Arrows in the *Perusall* system indicating replies

Conceptual Framework reading assignment						
Submission	Page	Score	Upvoters	Replies	Group	
Why was the conceptual framework of 2010 revised?	1	0	0	1	5	
 The 2010 conceptual framework was revised for various reasons. It was widely critiqued for lacking clarity as well as missing some important concepts. The 2018 conceptual framework is more detailed, includes several new concepts and new definitions and recognition criteria for assets and liabilities.	1	2	0	0	5	
Who would have the authority to change the conceptual framework?	2	1	0	1	5	
 I think that would be International Accounting Standards Board (IASB) which is a independent organization that develop International Financial Reporting Standards (IFRS).	2	1	0	0	5	
I really am not sure what this mean?	5	0	0	0	5	
I am not completely understanding what this means	7	0	0	2	5	
 hey. There are two kinds of reports. 1. Special reports that are reports that the business itself wants or that is intended for a specific target audience or group and doesn't have a specific format. 2. General purpose Financial Statements is what IFRS requires of a business that usually has a large number of employees and whose Financial Statements have a big influence in the decision making over a large number of Investors and Creditors. So they're for the purpose of making Investors and Creditors make decisions regarding the business.	7	2	7	0	5	
 Thank you. The "special reports" that are referred to above is the integrated reports and sustainability reports that we discussed in pervasive skills sessions last year	7	2	0	0	5	
How often are the current standards updated and what events would result in a change ?	7	1	0	3	5	

4.4.3 **Students' experiences (RQ 2)**

4.4.3.1 ***Survey approach***

In response to Research Question 2, a survey approach was followed to collect qualitative and quantitative data relating to the students' experiences of using *Perusall*. Obtaining insights into the students' experiences of using an OSAP, while collaboratively reading and annotating a financial reporting standard, may provide a deeper understanding of factors underlying the nature of their interactions (RQ 1).

Quantitative data were generated using a 7-point Likert scale (1 – strongly disagree to 7 – strongly agree) in nine closed-ended questions (Table 4-1). Seven points in a Likert scale is considered an optimal number of options within a bipolar continua⁴ (Krosnick and Fabrigar 1997). An appropriate verbal label was given to each response option in the survey instrument (e.g., strongly agree or agree) to make each option seem equally possible and clarify the meaning of each option (Krosnick 1999). The visual balance of the response scale was consistent to prevent any confusion on the respondents' part and to allow for the collection of unbiased data (Tourangeau, Couper and Conrad 2004; Pornel and Saldaña 2013). The midpoint or 'neutral' option was included as a Likert scale option to not eliminate the possibility of respondents truly having a neutral opinion and also to avoid forcing respondents to choose a specific direction (Tsang 2012).

Qualitative data were collected via four open-form response questions (Table 4-1). The questions included in the survey instrument are based on those used by Feiden (2015) in a pilot study assessing student perception of another annotation platform in a classroom environment. The survey instrument was independently reviewed by subject matter experts and education specialists for the design and the clarity of the questions. The review resulted in no amendments. The survey instrument was delivered using a uniform visual layout (Dillman, Smyth and Christian 2014) through *Google Forms* following ethical clearance obtained from the institutional review board.

⁴ Bipolar continua places opposing concepts, such as positive or negative opinions, within a single overarching construct (Tay and Jebb 2018).

Table 4-1: Survey instrument questions

Please answer question 1 to 9 using a 7-point Likert scale (1 – strongly disagree; 7 – strongly agree):	
1.	Overall, I enjoy using <i>Perusall</i> .
2.	I prefer using <i>Perusall</i> to only reading the IFRS.
3.	<i>Perusall</i> is useful for promoting discussion.
4.	<i>Perusall</i> allows me to better understand the individual topics as opposed to reading on my own.
5.	I think more about how well I understand the readings when using <i>Perusall</i> .
6.	I prefer an online annotation system, such as <i>Perusall</i> , to in-class discussions of the readings.
7.	I am more comfortable discussing material using an online system compared to discussing during class in a group.
8.	Using <i>Perusall</i> is a significant investment of time.
9.	Ultimately, I think that <i>Perusall</i> was a waste of time.
Questions 10 – 13 are open-form response questions:	
10.	What are your general thoughts and impressions about <i>Perusall</i> and/or our use of the system?
11.	Are there specific things you like about <i>Perusall</i> ?
12.	Are there specific things you dislike about <i>Perusall</i> ?
13.	In the space below, please feel free to write any other thoughts you have on or about <i>Perusall</i> . These can relate to the actual system (i.e. features you want to see implemented or those you don't like) or they can relate to the implementation of <i>Perusall</i> in the course or any other general comments.

4.4.3.2 Analysis

Microsoft Excel (2021) was used to analyse the quantitative survey data. An initial data integrity check was performed and descriptive statistics (e.g., median, range and frequencies) were calculated for each closed-ended survey question. Means and standard deviations are not considered suitable when ordinal Likert scale responses are analysed as their meanings are not clear (Jamieson 2004; Sullivan and Artino 2013). Reporting the median as well as the frequency distribution of responses are considered to portray a more useful picture of the data set (Sullivan and Artino 2013). The median was, therefore, used as the primary measure of central tendency for the Likert scale ordinal data obtained through the survey instrument (Jamieson 2004; Sullivan and Artino 2013). The explanation of the median was supplemented by the Inter-Quartile Range (IQR) and the frequencies within each survey question.

The qualitative data collected from the survey instrument were analysed through a content analysis (Cooper 2017) and by identifying themes from the reflections provided by the students on their experience of using *Perusall* and the nature of their interactions. Basic themes were initially developed and coded using *NVivo 12*. The coded responses were scrutinised at a later point in time and any inconsistencies between the initial and subsequent analysis were resolved.

4.5 RESULTS AND DISCUSSION

4.5.1 Nature of students' interactions (RQ 1)

The initial exploration of the nature of financial reporting students' text-based interactions with each other, using an OSAP, while collaboratively reading the content of a financial reporting standard (RQ 1) revealed that 485 students (98% of the students registered for the intermediate financial reporting course) participated in the reading assignment and, in total, shared 13,484 annotations (Table 4-2). 6,181 (46%) of these annotations were responses to questions or comments made by other students. 2,882 (21%) of the annotations, were upvoted by other students, indicating that they found these annotations helpful or had a similar comment or question. 10,496 student annotations were *co-constructing shared perspectives and meanings*, with significantly fewer annotations *articulating individual perspectives* (n=2,911) (Figure 4-5). Minimal annotations in the *social presence* (n=255) and *accommodating or reflecting the perspectives of others* (n=73) stages were evident. There were no annotations *building shared goals and purposes* (n=0) or *producing shared artefacts* (n=0) (Table 4-2) (Figure 4-5). The stages in the collaboration model are not mutually exclusive, therefore, the total annotations coded under each of the stages add up to more than the total annotations made by the students. Consequently, the number of annotations coded to each stage of the collaboration model is not expressed as a percentage of the total annotations made.

Table 4-2: Descriptive analytics and annotation frequencies

Number of students registered on <i>Perusall</i>	Total annotations	Replies	Upvotes	Annotations coded under the stages within the collaboration model* (n)**					
(N)	(n)	(n)	(n)	1	2	3	4	5	6
485	13,484	6,181	2,882	255	2,911	73	10,496	0	0
* Stages within the collaboration model: 1: <i>Social presence</i> 2: <i>Articulating individual perspectives</i> 3: <i>Accommodating or reflecting the perspectives of others</i> 4: <i>Co-constructing shared perspectives and meanings</i> 5: <i>Building shared goals and purposes</i> 6: <i>Producing shared artefacts</i>									
** The stages in the collaboration model are not mutually exclusive, therefore the total annotations coded under each of the stages add up to more than the total annotations made.									

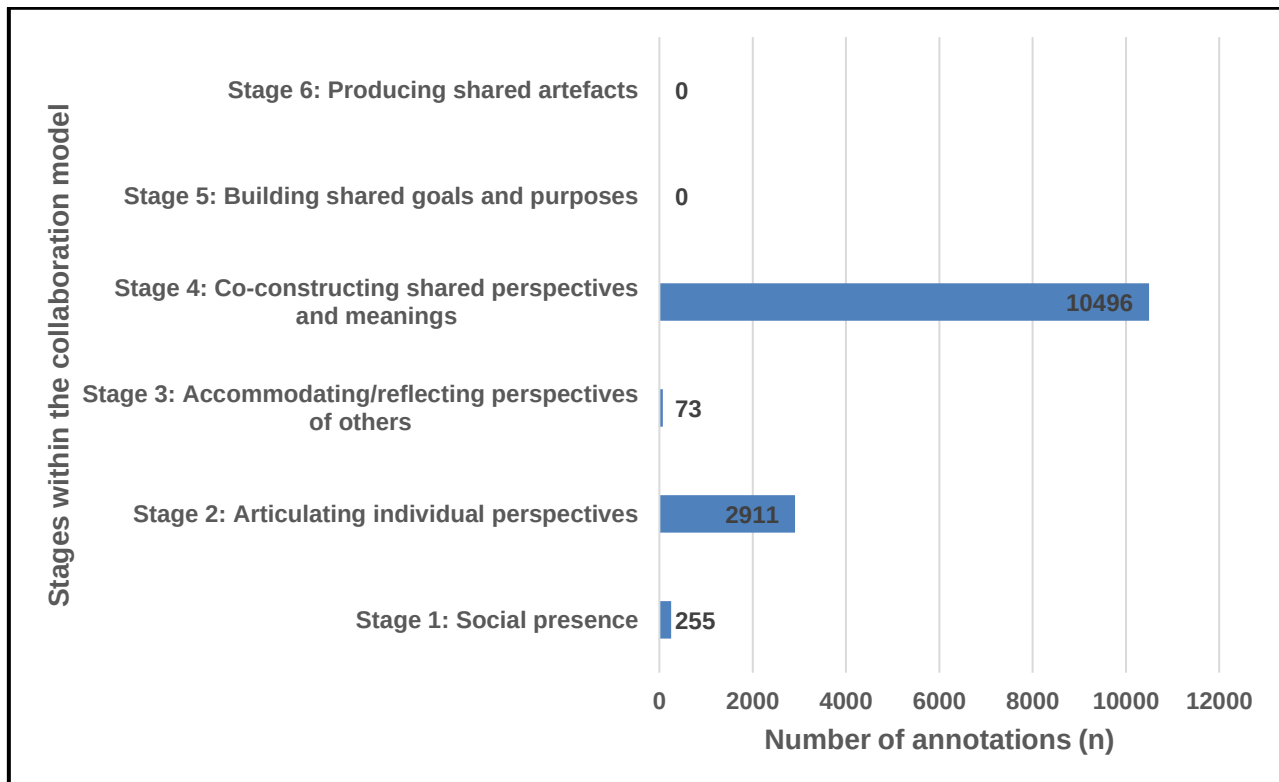
The purpose of an OSAP is primarily to enable students to discuss and learn a piece of written text collaboratively without time and space constraints (Gao 2013). The purpose of an OSAP is, therefore, not to build or produce a single joined output at the end of the process. Therefore, within the context of an OSAP, it is plausible for there not to be any annotations coded to the final 2 stages of the collaboration model. It is submitted, that even though no annotations were coded to the highest stages in the collaboration model, the students still demonstrated collaboration while reading and annotating their study material using an OSAP. The majority of the students' interaction developed around asking and answering questions. The indicators of *co-constructing shared perspectives and meanings*, which primarily focuses on asking and responding to questions, are more aligned with the overall objective of an OSAP, which is to collaboratively gain a better understanding of the written text. To gain deeper insights into these initial observations, the results for each of the processes or stages in the collaboration model evident in this study are discussed separately.

Stage 1: Social presence

In general, participants in online asynchronous discussions in CSCL environments should first create social presence in order for meaningful interaction and collaboration to follow (Kreijns, Kirschner and Jochems 2003; Murphy 2004; Coutinho and Lisboa 2014; Schaefer et al. 2019; Adams and Wilson 2020; Shan and Wang 2021). Indicators of *social presence* interaction include, *inter alia*, 'sharing personal information', 'recognising group presence',

‘expressing appreciation towards other participants’ and ‘expressing feelings or emotions’ (Murphy 2004). Results from prior studies, adopting the same collaboration model (Murphy 2004) to analyse the interaction on online asynchronous discussion platforms, suggested that the largest portion of interactions covered social presence (Murphy 2004; Coutinho and Lisboa 2014; Schaefer et al. 2019; Shan and Wang 2021).

Figure 4-5 Distribution of analysed annotations



However, of the OSAP annotations analysed in this study, only 255 of the student annotations contributed towards creating social presence (stage 1) (Figure 4-5). This could be attributed to these students being able to establish their social presence by attending daily face-to-face lectures and/or through being enabled to engage in a variety of other collaboration activities. The students are, therefore, already part of a strong community of learning and are able to more quickly transition to a higher level of collaboration, than if they were not already familiar with each other. The anonymity of the annotations might also have contributed to the low number of annotations categorised to this stage. In an anonymous environment, students might be less inclined to engage in typical social presence interaction. Students were not required to post personal introductions as part of the collaborative reading assignments, as was the case in other studies applying the collaboration model, yielding

higher numbers of social presence interaction (Murphy 2004; Schaefer et al. 2019). Furthermore, the nature of the reading assignment, which required each student to make a minimum of 27 thoughtful annotations, could also have contributed to the low number of social presence interaction. Annotations categorised as social presence interaction would usually not be regarded by the *Perusall* system's integrated assessment algorithm as a thoughtful comment, which potentially disincentivised the students to post these types of annotations.

The limited number of annotations that established social presence were primarily expressions of feelings and emotions. In particular, many of the annotations were of a complimentary nature, expressing appreciation towards other students' contributions, for example: *"This is an excellent question!"*; *"Thank you very much - it makes so much more sense now, 🙌"*; *"Thanks I was so confused on first read and then your annotation cleared it all up"* and *"Wow thanks for setting it out like this. I really understand this A LOT better"*. Some social presence annotations expressed feelings of confusion due to a lack of understanding of the work, for example: *"I am completely lost here. Can someone please explain this because I do not understand"*; *"I don't quite understand this. Please explain in plain English"* and *"I am confused at what this paragraph is actually trying to say. If someone could maybe explain in another way?"*. The students did not share any personal information and very few students greeted or addressed the group to recognise group presence. There was also no stating of goals related to participation or expressing of motivation about the project or participation. This may be due to the reading assignment requiring individual student annotations as opposed to a single combined output or end product.

Stage 2: Articulating individual perspectives

The second highest number of annotations (n=2,911) were those *articulating individual perspectives* (stage 2) (Figure 4-5). Articulating individual perspectives is important in the collaboration process (Murphy 2004) as it could provoke subsequent interaction and collaboration, as observed in some of the evidence (Figure 4-6).

Figure 4-6: Interaction provoked by student's individual perspective

The screenshot displays a digital interface with a document on the left and a chat window on the right. The document, titled 'CONCEPTUAL FRAMEWORK FOR FINANCIAL REPORTING', contains text about 'Fair value'. The chat window, titled 'Current conversation', shows four messages from different users (represented by icons: a yellow circle with 't', a pink circle with 'MO', a green circle with 'B', and a blue circle with a globe). Blue boxes with white text are overlaid on the chat messages, with arrows pointing to them:

- Personal opinion/belief (stage 2)**: Points to the first message: "For me i believe fair value is the best method for measurement as it gives you an estimation based on market prices."
- Response to previous comment (stage 4)**: Points to the second message: "I agree with you on that as the estimation will be from a universal source, thus making it relevant."
- Response to previous comment (stage 4)**: Points to the third message: "I believe so too, when the items are measured at fair value it ensures that assets, for example, are measured using market value. That would also insure that when the asset is sold the company will not have a big loss, because the value in the financial statements is already based on market price."
- Response to previous comment (stage 4) and Introducing new perspective (stage 3)**: Points to the fourth message: "I see where you are all coming from, however, if you read the paragraph below it states that fair value 'reflects the perspective of market participants' and is measured using an 'assumption'. This shows that there could be discrepancies between what one entity finds as the fair value compared to another entity, for the same asset."

It is suggested that many students tend to articulate individual perspectives, not in an attempt at stimulating interaction or to actively collaborate with fellow students, but instead to chase the minimum number of annotations required. Many of these annotations articulating individual perspectives were monologues such as, *“In my opinion the cash flow statement is the most reliable source to use if the user wants to view the overall operations of the business”*. While others were students simply summarising the content of the Framework, which often resulted in a mere repetition of the written text, for example: *“The information in the entity's financial statements should be relevant and faithfully represented. Both of these characteristics must be present and you cannot have one without the other”*. Consequently, many of these monologues and individual statements did not instigate further interaction and collaboration amongst the students and may be symptomatic of students simply chasing the required number of annotations.

Stage 3: Accommodating or reflecting the perspectives of others

The annotations *accommodating or reflecting the perspectives of others* (stage 3) (n=73) mainly included indicators of direct or indirect disagreement, with only a few instances of introducing new perspectives or co-ordinating perspectives noted (Figure 4-5). The small number of annotations accommodating or reflecting the perspectives of others, is consistent with prior studies, where students that interacted on an OSAP posted either no or very few messages of disagreement (Gao 2013; Sun and Gao 2017). Disagreement also rarely occurred during other online asynchronous discussions (Jeong 2003; Murphy 2004; Coutinho and Lisboa 2014; Schaefer et al. 2019; Shan and Wang 2021). The absence of disagreement could reflect the students' intention not to offend their peers when bringing in new perspectives or correcting others' opinions (Clarke and Bartholomew 2014; Schaefer et al. 2019). Examples of annotations expressing disagreement were always part of a conversation exhibiting interaction and collaboration (Figure 4-7).

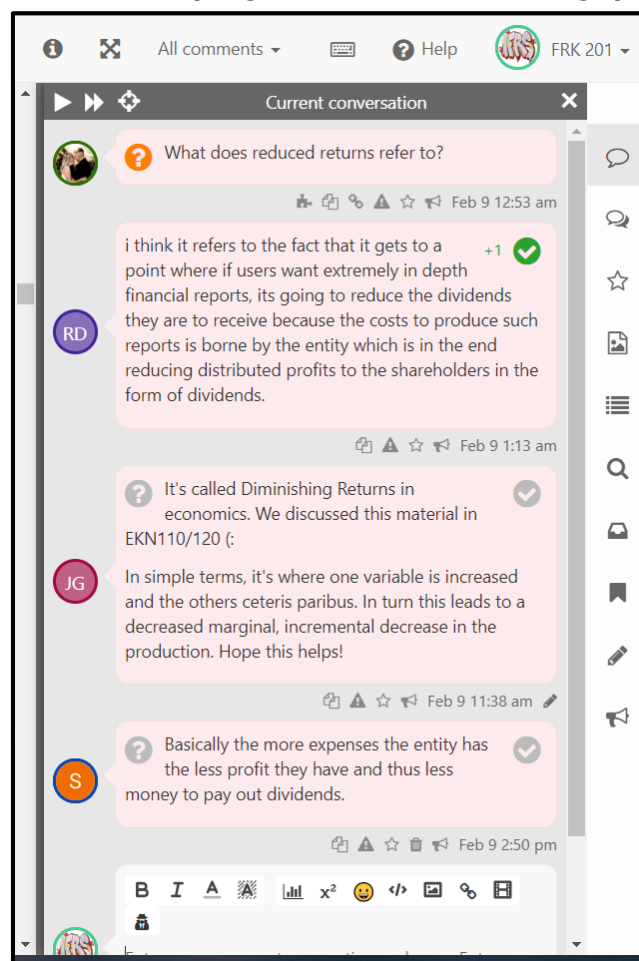
Figure 4-7: Disagreement displayed in an interactive conversation

Figure 4-7 displays an interactive conversation interface showing a document on the left and a chat window on the right. The document is titled "CONCEPTUAL FRAMEWORK FOR FINANCIAL REPORTING" and contains sections on "Understandability" and "The cost constraint on useful financial reporting". The chat window, titled "Current conversation", shows three messages. The first message, from user "L", states: "I assume that the financial statements must be prepared in such a way that even a person who does not know accounting is able to read and understand them. This is because some potential investors may not be in knowledgeable in the field of accounting." The second message, from user "A", responds: "Any ordinary person who may not have the full knowledge and understanding of accounting should be able to determine the state of the entity by using the information provided. This is why understandability is important." The third message, from user "LM", responds: "I beg to differ on this point. My view is that financials are prepared for users with the assumption that those users have some base knowledge accounting and economics. Making information 'understandable' is just so that the users understanding of the entities financials is supplemented. Therefore, potential investors that lack the knowledge of accounting might have to hire the services of a professional to break it down for them." The chat window also shows a fourth message from "LM" at the bottom: "Information should be so clear that is easier for users to understand it." Blue callout boxes with arrows point to the chat messages: "Personal opinion/belief (stage 2)" points to the first message, "Response to previous comment (stage 4)" points to the second message, and "Response to previous comment (stage 4) and Disagreement (stage 3)" points to the third message.

Stage 4: Co-constructing shared perspectives and meanings

The vast majority of annotations during the reading assignment (n=10,496), represented students *co-constructing shared perspectives and meanings* (stage 4) (Figure 4-5). 92% (n=446) of the students registered on *Perusall* (N=485) contributed to this number of annotations. Evidence of interaction and collaboration manifested primarily through conversations starting with students asking questions and others responding (Figure 4-8).

Figure 4-8: Conversations developing from students asking questions



The main indicators for this stage of the collaboration model relate to some form of question asked, including 'asking for clarification/elaboration', 'posing rhetorical questions', and 'soliciting feedback' (Murphy 2004). 'Responding to questions' and 'sharing advice' are also indicators for this stage of the collaboration model (Murphy 2004). The high number of annotations categorised to this stage is primarily as a result of many students asking some form of question ranging from basic questions such as "*Can someone please explain this in*

a simple way?” to more advanced questions such as *“How can an asset or liability not exist when it meets the definition of an element?”*. Fewer students responded to questions or shared advice. This is corroborated by the analytics from the OSAP’s system which confirmed that only 46% of annotations presented responses to questions and comments made. From a knowledge construction point of view, simply adding facts, opinions or asking questions without elaboration are considered to be at a superficial knowledge construction level (Xie and Ke 2011). Therefore, even though the nature of the majority of the student annotations indicates a higher level of collaboration according to the collaboration model used, the level of knowledge construction achieved requires further research.

Responses to questions often included the sharing of information and resources, varying between references to specific paragraphs in the Framework, external websites and other subject content and IFRS (Table 4-3). These inclusions indicate that the students engaged with the material beyond their supposed knowledge base and sought out answers instead of relying on other students to provide the answers (Feiden 2015).

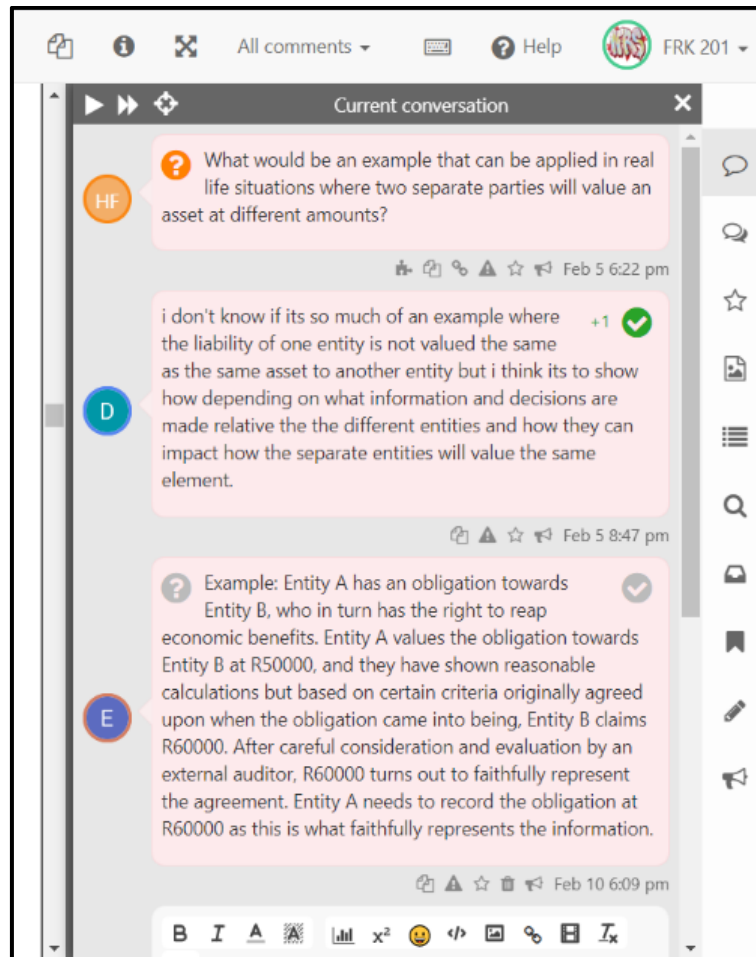
Table 4-3: Types of information and resources shared

Types of information and resources shared	Example annotations
Framework paragraphs	<i>“I think the mere fact that there is a probability that benefits will be transferred is what they are talking about. It doesn't matter how big or small the probability is it just needs to be present. Refer to para. 4.15.”</i>
External websites	<i>“Try reading this https://legaldictionary.net/executory-contract/ for a better understanding of what an executory contract is. It gives examples too.”</i>
Other subjects	<i>“I actually remember learning about this in Commercial Law. If you have any troubles with the pledging of rights etc., just consult your Commercial Law textbook 😊.”</i>
Other IFRS	<i>“Refer to IAS 16 paragraph 16 about the elements of cost. Paragraph 15 also states that an asset is measured at cost which is the price we paid it at.”</i>

Students demonstrated the transferal of knowledge in sharing their own examples to clarify a specific matter (Figure 4-9). The sharing of advice in student responses was evident in annotations such as, *“A synonym for onerous is burdensome or troublesome. Having the synonyms made me understand the sentence better”*; *“Just a note: It would be wise to study these definitions, since they can help when trying to decide how to classify a certain item”*;

and “An easy way of remembering this definition is to think about the accounting equation. $A=OE+L$ therefore $OE= A-L$ ☺”.

Figure 4-9: Examples given in reply to question asked



Stage 5: Building shared goals and purposes and Stage 6: Producing shared artefacts

As the essence of collaboration is found in a relationship in which participants build something together (Shrage 1995), these two stages are defined as the ultimate point of collaboration (Murphy 2004). Specific indicators that guided the categorisation of interaction to these stages include, *inter alia*, ‘proposing a shared goal or purpose’, ‘working together towards a shared goal’, and ‘document or other artefact produced by group members working together’ (Murphy 2004). From the total sample of student annotations analysed, no annotations related to *building shared goals and purposes* and *producing shared artefacts*. The lowest number of annotations were, therefore, categorised at the highest-

level stages of the collaboration model. This result is in line with previous findings, investigating online asynchronous discussions (Murphy 2004; Coutinho and Lisboa 2014; Schaefer et al. 2019; Shan and Wang 2021).

An OSAP in general, and *Persuall* specifically, is a social learning platform “designed to promote high pre-class reading compliance, engagement, and conceptual understanding” (Miller et al. 2018, 3). Using an OSAP, therefore, does not have as an objective to build or produce a single joint output at the end of the collaborative reading process, other than the students’ combined set of annotations. The objective of the Framework reading assignment was for students to collaboratively read and annotate the written text to gain a better understanding of the content before class. From the earlier discussion it is evident that the students primarily asked questions and replied to questions asked in an attempt to gain a better understanding of the Framework.

Therefore, in the context of an OSAP, the full essence of collaboration can perhaps not be achieved. It is, however, submitted that even though the student interaction did not progress to a point of producing a shared artefact, the level of interaction using the OSAP did demonstrate the level of collaboration necessary to meet the objective of the reading assignment. The analysis of student annotations suggests that the student interaction supported the co-creation process, primarily through a process of asking and answering questions relating to the content of the written text that they were required to collaboratively read and annotate.

4.5.2 Students’ experiences (RQ 2)

4.5.2.1 *Descriptive statistics*

To explore financial reporting students’ experiences of using an OSAP, while collaboratively reading and annotating a financial reporting standard (RQ 2) a survey approach was followed. The survey yielded an 87% (N=419) response rate. A test for non-response bias was performed. Statistical data on gender is published annually by the university for the total student population. The sample for this study comes from one year group of the total student population at the university. A Chi Squared test was performed on the gender of these

students to identify if the sample was representative of the total student population. No indication of response bias was identified as there was no significant difference between the sample and the total student population ($X^2(1)=1,52$, $p=0,217$). In addition, there is nothing to suggest this year group is not representative of the full university population as the profile of the university's students is similar across year groups, with the statistics for gender similar in 2019, 2020 and 2021.

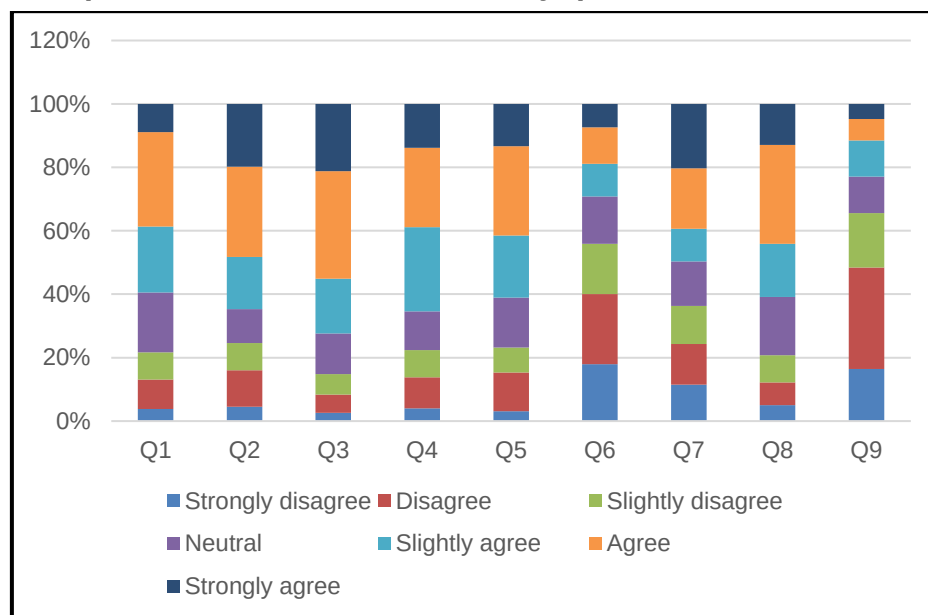
The descriptive statistics and frequencies for the close ended survey questions are presented in Table 4-4 and Figure 4-10, respectively. The respondent students' overall experiences of using an OSAP was positive. Many students ($n=249$; 59%; $Mdn=5$; $IQR=4-6$) agreed to some degree that they enjoyed using the platform (Question 1). This result is consistent with previous research (e.g., Mendenhall and Johnson 2010; Nokelainen et al. 2003; Novak et al. 2012; Gao 2013; Feiden 2015; Olson and Brown 2018; Clarke 2021; Walker 2019; Suhre et al. 2019; Cecchinato and Foschi 2020; Woodward and Neunaber 2020).

Table 4-4: Descriptive statistics – close ended survey questions

Survey questions	N	Min	Max	Median	IQR
1. Overall, I enjoy using <i>Perusall</i> .	419	1	7	5	2
2. I prefer using <i>Perusall</i> to only reading the IFRS.	419	1	7	5	2
3. <i>Perusall</i> is useful for promoting discussion.	419	1	7	6	2
4. <i>Perusall</i> allows me to better understand the individual topics as opposed to reading on my own.	419	1	7	5	2
5. I think more about how well I understand the readings when using <i>Perusall</i> .	419	1	7	5	2
6. I prefer an online annotation system, such as <i>Perusall</i> , to in-class discussions of the readings.	419	1	7	3	3
7. I am more comfortable discussing material using an online annotation system compared to discussing during class in a group.	419	1	7	4	3
8. Using <i>Perusall</i> is a significant investment of time.	419	1	7	5	2
9. Ultimately, I think that <i>Perusall</i> was a waste of time.	419	1	7	3	2
Note: Response values between 1 and 7 represent varying degrees of agreement on a Likert scale where 1 corresponds to 'strongly disagree' and 7 to 'strongly agree'.					

Many students preferred using an OSAP to only reading IFRS (n=271; 65%; Mdn=5; IQR=4–6) (Question 2) and found an OSAP useful for promoting discussion (n=303; 72%; Mdn=6; IQR=4–6) (Question 3). The students agreed that they were able to understand the individual topics better when using an OSAP than when reading it on their own (n=274; 65%; Mdn=5; IQR=4–6) (Question 4). This result may be because, in the students' opinion, using an OSAP assisted them in reflecting on their understanding of the readings (n=256; 61%; Mdn=5; IQR=4–6) (Question 5).

Figure 4-10: Frequencies of close ended survey questions



Despite these generally positive sentiments regarding the use of an OSAP, many of the students prefer that the discussion of their study material take place in-class (n=234; 56%; Mdn=3; IQR=2–5) (Question 6). However, it is cautioned that the use of an OSAP should be seen as complimentary to in-class discussions and not as a substitute. Even though more students prefer in-class discussions of their study material, 50% of the students indicated that, should they have to participate in discussions, they are more comfortable to discuss study material online than in-class (n=208; Mdn=4; IQR=3–6) (Question 7). This could hint at the students experiencing some degree of communication apprehension (Coetzee, Schmulian and Kotze 2014) when they are required to discuss their study material. Although the students perceive that the use of an OSAP requires a significant investment of time (n=255; 61%; Mdn=5; IQR=4–6) (Question 8), they do not perceive this time investment to be a waste (n=275; 66%; Mdn=3; IQR=2–4) (Question 9).

4.5.2.2 Qualitative analysis

The qualitative analysis provided a richer understanding of the students' experiences using an OSAP as well as the nature of their interactions while using the platform. This analysis confirmed the students' general positivity towards the use of an OSAP. A noteworthy contributor to the students' overall positive experiences were the interaction and collaboration opportunities that it presented. Using an OSAP was perceived as *"a good interactive way of sharing knowledge"* as well as *"great for promoting collaboration amongst students when dissecting the standards"*. These perceptions reiterate the high frequency of student annotations coded to the *co-constructing shared perspectives and meanings* stage of the collaboration model (Table 4-2), which points towards a high level of collaboration. *"I like how we create the discussion based on comments or questions we post. This helps one to realize a few things that might have been overlooked and to enhance whatever knowledge one already had"*.

The pre-reading of study material was considered *"helpful in that it forces students to actually do their work by reading the standards"*. Many students confessed: *"I never would have done it on my own"*. Further, the reading assignments resulted in *"a better understanding of the topic when the lecturers discuss it in class"*, *"which makes the actual lecture worth more"*. Some students particularly appreciated that *"it helped [them] understand many aspects of each standard by it being explained by another student, in a way [they] can understand."* It was also noted that the readings had to be *"done properly"* by *"not only read[ing] the standards but understand[ing] them, because you have to think about the questions you want to ask and the comments you would like to make to help others understand"*.

The student interactions on *Perusall* are fully anonymous. This feature of the OSAP afforded the students an environment in which many students felt comfortable to communicate. *"[Perusall] allows me to ask questions I'd normally feel shy to ask"*. Many of the respondents are not English first language speakers, so the interaction via the OSAP allowed these students to seek clarification on the meaning of words or phrases. *"I like that if a statement or word confuses me, there is always someone who will understand and will have assisted"* and *"I enjoy the fact that when things are not understood other students explain it in their own words which make it easier to understand"*. It is, therefore, submitted that an OSAP has

the potential to create an environment in which communication apprehension and language barriers can be surmounted and enhances the equity of the classroom.

Despite the general positivity, expressed by the students, towards the use of an OSAP, some reservations were also raised. Although the students *“like[d] the ability to discuss and ask other students questions and answer each other”* some students expressed a lack of trust in their classmates and found it *“useless at times because [they] depended on fellow students to help [them] with understanding, knowing very well that their knowledge is just as incomplete”*. Many students would, therefore, *“rather wait for the lecturer to give insight on a certain paragraph”* as *“the lecturer’s answer will always take first preference”*. This may be a reason why many of the students prefer in-class discussions as opposed to online (Table 4-4).

The system’s integrated assessment algorithm was often mentioned as a feature of the OSAP system which the students particularly disliked. Despite this scoring system having been validated and perceived as adequate by student users (Cecchinato and Foschi 2020), many students in this present study perceived the OSAP’s scoring system as *“flawed”* and *“unfair”*. The students either did not want their annotations to be graded or did not agree with the scores awarded. The validity of the OSAP used for this study’s integrated assessment algorithm to score annotations of a technical document such as financial reporting standards is, therefore, suggested as an area for future research.

Some students held the perception that *“students only use Perusall because it is compulsory”* which made it *“difficult to believe that comments students make are true and useful for other[s] to build a valid discussion”*. This sentiment was echoed by other students that suggested that *“some users only commented arbitrary definitions and statements for purposes of getting to the required number of comments”* and that *“people comment random things just to make up marks”*. Students further commented that *“feedback on comments and questions [was] minimal”* and *“there’s not a definite chance that [your questions] will be answered”*. These opinions support the earlier observations indicating that the *articulating individual perspectives* stage of the collaboration model (Table 4-2) were largely characterized by monologues and summaries of the content read as well as the low percentage (46%) of responses revealed by the OSAP system’s analytics (Table 4-2). The

antagonism experienced by some students towards the OSAP system's integrated assessment algorithm possibly also resulted in the dumping of annotations in an attempt to earn the maximum score as opposed to the students fully embracing the collaborative learning opportunity afforded. These observations illuminate the dilemma between prescribing activities and ensuring that students take them up as meaningful activities, which is also a common disadvantage of the flipped classroom environment (Taylor 2015; Akçayır and Akçayır 2018). Students in a flipped classroom environment are often found to spend limited time on pre-class activities (Miller et al. 2018) and lack proper preparation for class (Long, Cummins and Waugh 2017). A lack of engaging in proper self-learning when completing the required pre-class activities is another challenge of the flipped classroom environment (Hwang, Lai and Wang 2015). All these challenges are admittedly valid when students are required to collaboratively read and annotate their study material using an OSAP before class. These challenges would, *inter alia*, require from instructors to intentionally motivate their students to ensure successful implementation of the OSAP, as student motivation is regarded as a crucial factor to the success of collaborative learning (Xie and Ke 2011) and also of the flipped classroom model (Brown, Danvers and Doran 2016; Long, Cummins and Waugh 2017).

Despite these reservations, the students' generally positive experience of the use of an OSAP was validated by comments such as *"Overall, Perusall has been a positive addition to the academic syllabus. The Perusall assignments were a good way to ensure that students actually read the material before class and therefore have a better understanding of the topic when the lecturers discuss it in class"* and *"I like Perusall very much. I think that it is very helpful to understand a topic better when other people give you their view of it and it also helped broaden the way I think about certain topics. It gave me time to reflect on the questions I ask and also on the questions my peers asked, and to really understand the core concept of a standard."*

4.6 CONCLUSION

Given the ever-changing world of work, professional accountants must engage in lifelong learning by continually learning and relearning throughout their careers. In order to learn and relearn, professional accountants must know how to gain knowledge from written

language. This study reports on the use of an OSAP, as a CSCL tool, by financial reporting students to collaboratively read and annotate their study material – IFRS.

The results of this study suggest that the students' overall experience of collaboratively reading and annotating their study material using an OSAP, was positive. The use of an OSAP enabled the students to collaborate and interact with their peers, motivated the students to read their study material in preparation for class, and improved the students' understanding of their study material. The OSAP also provided an environment in which students felt comfortable to communicate and in which they could clarify the meaning of words and phrases. Despite these positives, there were some reservations concerning the validity of peer responses to questions asked. Accordingly, some students indicated that they prefer in-class discussions of their study material, due to a lack of trust in the feedback provided by their peers and a preference towards instructor explanations.

While it is acknowledged that active instructor guidance and involvement in the use of an OSAP may contribute to meaningful student interaction (Kiili et al. 2012; Razon et al. 2012; De Boer 2020), within the context of large student cohorts this is a challenging prospect. Consequently, investigating the effect of instructor involvement during the use of an OSAP in a large class environment in the form of, for example, online prompts, guiding inquiries and scaffolding (Kreijns, Kirschner and Jochems 2003; Razon et al. 2012; De Boer 2020) is suggested as an area for future research.

Evidence of collaboration in the students' text-based interactions primarily manifested through asking and answering questions. The majority of annotations were, therefore, categorised to stage 4 of the collaboration model which relates to *co-constructing shared perspectives and meanings*. Monologues and individual comments, without accommodating or reflecting the perspectives of others, were also common as some students may have made annotations solely for the purpose of earning marks as opposed to collaboratively learning with their peers. As the students in this study were already part of a strong community of learning it did not appear necessary for them to establish high levels of social presence interaction in the OSAP as a predecessor for reflection and co-construction in an online environment.

The results of this study suggest that the students progressed to a higher level of collaboration and that the use of an OSAP in a large real-world classroom, with limited instructor guidance, therefore, has the potential to contribute to the students' reading comprehension of IFRS. Despite the high level of collaboration evident in the students' annotations, as well as the students' self-perceived improved understanding of the study material reported in this study, the impact on student learning and knowledge construction was not systematically investigated. As a result, no conclusion can be drawn on the extent of the students' learning as a result of the collaborative reading activity implemented. Although prior research suggests the potential of using OSAPs for learning (Hwang, Wang and Sharples 2007; Novak et al. 2012; Miller et al. 2016), future experimental research into actual learning gains and knowledge construction resulting from collaboratively reading financial reporting standards using an OSAP in a large real-world classroom is encouraged. Furthermore, this study focused on the collaborative reading of the Framework, at the core of IFRS. Future research investigating financial reporting students' collaborative reading of other IFRS, using an OSAP, is needed.

Although this study only examined the use of an OSAP at a single university, potentially limiting the generalisability of the findings, this study contributes to the online social annotation and accounting education literature by providing insights into the nature of financial reporting students' text-based interactions with each other while collaboratively reading and annotating the content of a technical document in a large real-world financial reporting classroom. The effective implementation of an OSAP in a financial reporting classroom could develop financial reporting students' lifelong learning competence and their ability to learn and relearn financial reporting standards as future professional accountants.

4.7 LIST OF REFERENCES

- Adams, B., and N. S. Wilson. 2020. "Building Community in Asynchronous Online Higher Education Courses Through Collaborative Annotation." *Journal of Educational Technology Systems* 49 (2): 250–261.
- Akçayır, G., and M. Akçayır. 2018. "The Flipped Classroom: A review of its Advantages and Challenges." *Computers & Education* 126: 334–345.
- Alexander, G. 1992. "Designing Human Interfaces for Collaborative Learning." In: A. R. Kaye (ed) *Collaborative Learning Through Computer Conferencing: The Najaden Papers*. Springer-Verlag, New York: 201–210.
- Baker, P. 2019. "An Experiment Using Two Methods of Teaching Accounting for Leases in Intermediate Accounting." *The Journal of Applied Business and Economics* 21 (6): 25–31.
- Barth, M. E. 2008. "Global Financial Reporting: Implications for U.S. Academics." *Accounting Review* 83 (5): 1159–1179.
- Bergmann, J., and A. Sams. 2012. "Flip Your Classroom: Reach Every Student in Every Class Every Day." *International Society for Technology in Education*.
- Brown, C. A., K. Danvers, and D. T. Doran. 2016. "Student Perceptions on Using Guided Reading Questions to Motivate Student Reading in the Flipped Classroom." *Accounting Education* 25 (3): 256–271.
- Cecchinato, G., and L. C. Foschi. 2020. "Perusall: University Learning-Teaching Innovation Employing Social Annotation and Machine Learning." *Qwerty-Open and Interdisciplinary Journal of Technology, Culture and Education* 15 (2): 45–67.
- Chen, C. M., and F. Y. Chen. 2014. "Enhancing Digital Reading Performance with a Collaborative Reading Annotation System." *Computers & Education* 77: 67–81.

Chen, C. M., L. C. Chen, and W. J. Horng. 2021. "A Collaborative Reading Annotation System with Formative Assessment and Feedback Mechanisms to Promote Digital Reading Performance." *Interactive Learning Environments* 29 (5): 848–865.

Chen, J. M., M. C. Chen and Y. S. Sun. 2010. "A Novel Approach for Enhancing Student Reading Comprehension and Assisting Teacher Assessment of Literacy." *Computers & Education* 55 (3): 1367–1382.

Chen, B., B. Hussein, and O. Poquet, O. 2021. "Modelling Network Dynamics in Social Annotation." In: *Proceedings of the NetSciLA21 workshop*.

Chen, C. M., M. C. Li, and T. C. Chen. 2020. "A Web-Based Collaborative Reading Annotation System with Gamification Mechanisms to Improve Reading Performance." *Computers & Education* 144: 103697.

Clarke, A. J. 2019. "Perusall: Social Learning Platform for Reading and Annotating (Perusall LLC, Perusall. com)." *Journal of Political Science Education* 17 (1): 149–154.

Clarke, L. W., and A. Bartholomew. 2014. "Digging Beneath the Surface: Analyzing the Complexity of Instructors' Participation in Asynchronous Discussion." *Online Learning* 18 (3): n3.

Coetzee, S. A., C. Janse van Rensburg, and A. Schmulian. 2016. "Differences in Students' Reading Comprehension of International Financial Reporting Standards: A South African Case." *Accounting Education* 25 (4): 306–326.

Coetzee, S. A., and A. Schmulian. 2011. "A Mixed Methods Pedagogical Approach to an Introductory Course to IFRS." *Accounting Instructors Report* Winter: 1–7.

Coetzee, S. A., and A. Schmulian. 2012. "A Critical Analysis of the Pedagogical Approach Employed in an Introductory Course to IFRS." *Issues in Accounting Education* 27 (1): 83–100.

Coetzee, S. A., A. Schmulian, and L. Kotze. 2014. "Communication Apprehension of South African Accounting Students: The Effect of Culture and Language." *Issues in Accounting Education* 29 (4): 505–525.

Cooper, S. 2017. "A Collaborative Assessment of Students' Placement Learning." *Assessment & Evaluation in Higher Education* 42 (1): 61–76.

Coutinho, C., and E. Lisboa. 2014. "Collaboration in Virtual Environments: A Study of Interactions in a Social Network." In: *E-Learn World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 421–428). Association for the Advancement of Computing in Education (AACE).

De Boer, V. 2020. "Stimulating Students' Interactions and Improving the Quality of Annotations in a Social Annotation Tool by Scaffolding through Collaboration Scripts." Master's Thesis. Open Universiteit.

Dillenbourg, P., and F. Fischer. 2007. "Basics of Computer-Supported Collaborative Learning." *Zeitschrift für Berufs- und Wirtschaftspädagogik* 21: 111–130

Dillman, D. A., J. D. Smyth, and L. M. Christian. 2014. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. New Jersey: John Wiley and Sons, Inc.

Feiden, G. 2015. "Pilot Study Assessing Student Perception of the Collaborative Annotation Platform Open Rev in a Classroom Environment. In: Uppsala Workshop on Pedagogical Research Projects. Uppsala University, Uppsala, Sweden.

Gao, F. 2013. "A Case Study of Using a Social Annotation Tool to Support Collaboratively Learning." *The Internet and Higher Education* 17: 76–83.

Garrison, D. R., T. Anderson, and W. Archer. 2000. "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education." *The Internet and Higher Education* 2 (2-3): 87–105.

Ghadirian, H., K. Salehi, and A. F. M. Ayub. 2018. "Social Annotation Tools in Higher Education: A Preliminary Systematic Review." *International Journal of Learning Technology* 13 (2): 130–162.

Henri, F. 1995. *Distance Learning and Computer-Mediated Communication: Interactive, Quasi-Interactive or Monologue?* In: O'Malley., C. (ed) *Computer Supported Collaborative Learning*. Berlin: Springer-Verlag: 145–164.

Hilton, S. R., and N. Johnstone. 2013. "The IFRS Transition and Accounting Education: A Canadian Perspective Post-Transition." *Issues in Accounting Education* 28 (2): 253–261.

Hodgdon, C., S. Hughes, and D. Street. 2011. "Framework-Based Teaching of IFRS Judgements." *Accounting Education: An International Journal* 20 (4): 415–439.

Hwang, G. J., C. L. Lai, and S. Y. Wang. 2015. "Seamless Flipped Learning: A Mobile Technology-Enhanced Flipped Classroom with Effective Learning Strategies." *Journal of Computers in Education* 2: 449–473.

Hwang, W. Y., C. Y. Wang, and M. Sharples. 2007. "A Study of Multimedia Annotation of Web-Based Materials." *Computers & Education* 48 (4): 680–699.

International Accounting Standards Board (IASB). 2018. *The Conceptual Framework for Financial Reporting*. London: IFRS Foundation.

International Financial Reporting Standards (IFRS) Foundation. 2022a. "IFRS Foundation Work Plan." Accessed 9 September 2022. <https://www.ifrs.org/projects/work-plan/>

International Financial Reporting Standards (IFRS) Foundation. 2022b. "Who Uses IFRS Accounting Standards?" Accessed 8 March 2022. <https://www.ifrs.org/use-around-the-world/use-of-ifrs-standards-by-jurisdiction/#analysis-of-the-166-profiles>

Jamieson, S. 2004. "Likert Scales: How to (ab) Use Them?" *Medical Education* 38 (12): 1217–1218.

Janse van Rensburg, C., S. A. Coetzee, and A. Schmulian. 2014. "South African Financial Reporting Students' Reading Comprehension of the IASB Conceptual Framework." *Journal of Accounting Education* 32 (4): 1–15.

Janse van Rensburg, C., S. A. Coetzee, and A. Schmulian. 2021. "Developing Digital Creativity Through Authentic Assessment." *Assessment & Evaluation in Higher Education* 1–21.

Jeong, A. C. 2003. "The Sequential Analysis of Group Interaction and Critical Thinking in Online." *The American Journal of Distance Education* 17 (1): 25–43.

Johnson, T. E., T. N. Archibald, and G. Tenenbaum. 2010. "Individual and Team Annotation Effects on Students' Reading Comprehension, Critical Thinking, and Meta-Cognitive Skills." *Computers in Human Behavior* 26 (6): 1496–1507

Jonassen, D., T. Mayes, and R. McAleese. 1993. *A Manifesto for a Constructivist Approach to Uses of Technology in Higher Education*. In: Duffy, T., J. Lowyck, and D. Jonassen (eds) *Designing Environments for Constructive Learning*. Berlin: Springer-Verlag: 231–247.

Kalir, J. 2020. "Social Annotation Enabling Collaboration for Open Learning." *Distance Education* 1–16.

Keevy, M. 2015. "Using Collaborative Learning Exercises to Transfer Pervasive Skills: Some South African Evidence." *Journal of Economic and Financial Sciences* 8 (2): 456–473.

Kiili, C., L. Laurinen, M. Marttunen, and D. J. Leu. 2012. "Working on Understanding During Collaborative Online Reading." *Journal of Literacy Research* 44 (4): 448–483.

Knuth, B. A., and D. J. Cunningham. 1993. *Tools for Constructivism*. In: Duffy, T., J. Lowyck, and D. Jonassen D (eds) *Designing Environments for Constructive Learning*. Berlin: Springer-Verlag: 164–188.

Kreijns, K., P. A. Kirschner, and W. Jochems. 2003. "Identifying the Pitfalls for Social Interaction in Computer-Supported Collaborative Learning Environments: A Review of the Research." *Computers in Human Behavior* 19 (3): 335–353.

Krosnick, J. A. 1999. "Survey Research." *Annual Review of Psychology* 50 (1): 537–567.

Krosnick, J. A., and L. R. Fabrigar. 1997. Designing Rating Scales for Effective Measurement in Surveys. In: Lyberg, L., B. Paul, M. Collins, E. De Leeuw, C. Dippo, N. Schwarz, and D. Trewin (eds.), *Survey Measurement and Process Quality* (pp. 141-164). New York: John Wiley and Sons, Inc.

Lento, C. 2016. "Promoting Active Learning in Introductory Financial Accounting Through the Flipped Classroom Design." *Journal of Applied Research in Higher Education* 8 (1): 72–87.

Lock, J., S. Lakhal, M. Cleveland-Innes, P. Arancibia, D. Dell, and N. De Silva, N. 2021. "Creating Technology-Enabled Lifelong Learning: A Heutagogical Approach." *British Journal of Educational Technology* 52 (4): 1646–1662.

Long, T., J. Cummins, and M. Waugh. 2017. "Use of the Flipped Classroom Instructional Model in Higher Education: Instructors' Perspectives." *Journal of Computing in Higher Education* 29: 179–200.

Lu, J., and L. Deng. 2013. "Examining Students' Use of Online Annotation Tools in Support of Argumentative Reading." *Australasian Journal of Educational Technology* 29 (2).

McGowan, S. 2012. "Going Beyond the Numbers in Teaching Financial Accounting: The Newsletter as an Assignment Option." *Issues in Accounting Education* 27 (4): 1095–1117.

McLoughlin, C., and J. Luca. 2002. "A Learner–Centred Approach to Developing Team Skills Through Web–Based Learning and Assessment." *British Journal of Educational Technology* 33 (5): 571–582.

Mendenhall, A., and T. E. Johnson. 2010. "Fostering the Development of Critical Thinking Skills, and Reading Comprehension of Undergraduates Using a Web 2.0 Tool Coupled with a Learning System." *Interactive Learning Environments* 18 (3): 263–276.

Miller, K., B. Lukoff, G. King, and E. Mazur. 2018. "Use of a Social Annotation Platform for Pre-class Reading Assignments in a Flipped Introductory Physics Class." *Frontiers in Education* (3).

Miller, K., S. Zyto, D. Karger, J. Yoo, and E. Mazur. 2016. "Analysis of Student Engagement in an Online Annotation System in the Context of a Flipped Introductory Physics Class." *Physical Review Physics Education Research* 12 (2): 1–12.

Murphy, E. 2004. "Recognising and Promoting Collaboration in an Online Asynchronous Discussion." *British Journal of Educational Technology* 35 (4): 421–431.

Nokelainen, P., J. Kurhila, M. Miettinen, P. Floréen, and H. Tirri. 2003. "Evaluating the Role of a Shared Document-Based Annotation Tool in Learner-Centered Collaborative Learning." In: *Proceedings 3rd IEEE International Conference on Advanced Technologies* (pp. 200–203). IEEE.

Northrup, P. 2001. "A Framework for Designing Interactivity into Web-Based Instruction." *Educational Technology* 41 (2): 31–39.

Novak, E., R. Razzouk, and T. E. Johnson. 2012. "The Educational Use of Social Annotation Tools in Higher Education: A Literature Review." *The Internet and Higher Education* 15 (1): 39–49.

Olson, E. D., and E. Brown. 2018. "Perceptions of Students in an Event Management Program of Annotation Systems and their Influence on Student Learning." *Journal of Hospitality and Tourism Education* 30 (2): 118–126.

Özdemir, E. Ç., and H. Akyol. 2019. "The Development of a Reading Comprehension Test." *Universal Journal of Educational Research* 7 (2): 563–570.

Pardo, L. S. 2004. "What Every Teacher Needs to Know About Comprehension." *International Reading Association* 58 (3): 272–280.

Peters, M., and M. Romero. 2019. "Lifelong Learning Ecologies in Online Higher Education: Students' Engagement in the Continuum Between Formal and Informal Learning." *British Journal of Educational Technology* 50 (4): 1729–1743.

Pornel, J. B., and G. A. Saldaña. 2013. "Four Common Misuses of the Likert Scale." *Philippine Journal of Social Sciences and Humanities University of the Philippines Visayas* 18 (2): 12–19.

Porter-O'Donnell, C. 2004. "Beyond the Yellow Highlighter: Teaching Annotation Skills to Improve Reading Comprehension." *English Journal* 82–89.

Razon, S., J. Turner, T. E. Johnson, G. Arsal, and G. Tenenbaum. 2012. "Effects of a Collaborative Annotation Method on Students' Learning and Learning-Related Motivation and Affect." *Computers in Human Behavior* 28 (2): 350–359.

Samuel, R. D., C. Kim, and T. E. Johnson. 2011. "A Study of a Social Annotation Modelling Learning System." *Journal of Educational Computing Research* 45 (1): 117–137.

Schaefer, T., J. Rahn, T. Kopp, C. M. Fabian, and A. Brown. 2019. "Fostering Online Learning at the Workplace: A Scheme to Identify and Analyse Collaboration Processes in Asynchronous Discussions." *British Journal of Educational Technology* 50 (3): 1354–1367.

Schmulian, A., and S. A. Coetzee. 2019. "Students' Experience of Team Assessment with Immediate Feedback in a Large Accounting Class." *Assessment & Evaluation in Higher Education* 44 (4): 516–532.

Schrage, M. 1995. *No More Teams! Mastering the Dynamics of Creative Collaboration*. New York: Doubleday.

Schuwirth, L. W., and C. P. Van der Vleuten. 2011. "Programmatic Assessment: From Assessment of Learning to Assessment for Learning." *Medical Teacher* 33 (6): 478–485.

Shan, J., and W. Wang. 2021. "Making and Sharing in Asynchronous Discussion: Exploring the Collaboration Process in Online Maker Community." *Interactive Learning Environments* 1–15.

South African Institute of Chartered Accountants (SAICA). 2021. "CA(SA) Competency Framework." Accessed 9 September 2022. <https://bit.ly/3RXRAYg>

Su, A. Y., S. J. Yang, W. Y. Hwang, and J. Zhang. 2010. "A Web 2.0-Based Collaborative Annotation System for Enhancing Knowledge Sharing in Collaborative Learning Environments." *Computers & Education* 55 (2): 752–766.

Suhre, C., K. Winnips, V. De Boer, P. Valdivia, and H. Beldhuis. 2019. "Students' Experiences with the Use of a Social Annotation Tool to Improve Learning in Flipped Classrooms." In: 5th International Conference on Higher Education Advances (pp. 955–962). Universitat Politècnica de Valencia.

Sullivan, G. M., and A. R. Artino Jr. 2013. "Analyzing and Interpreting Data from Likert-Type Scales." *Journal of Graduate Medical Education* 5 (4): 541–542.

Sun, Y., and F. Gao. 2017. "Comparing the Use of a Social Annotation Tool and a Threaded Discussion Forum to Support Online Discussions." *The Internet and Higher Education* 32: 72–79.

Tay, L., and A. T. Jebb. 2018. "Establishing Construct Continua in Construct Validation: The Process of Continuum Specification." *Advances in Methods and Practices in Psychological Science* 1 (3): 375–388.

Taylor, A. 2015. "Flipping Great or Flipping Useless? A Review of the Flipped Classroom Experiment at Coventry University London Campus." *Journal of Pedagogic Development* 5 (3): 57–65

Tourangeau, R., M. P. Couper, and F. Conrad. 2004. "Spacing, Position, and Order: Interpretive Heuristics for Visual Features of Survey Questions." *Public Opinion Quarterly* 68 (3): 368–393.

Tsang, K. K. 2012. "The Use of Midpoint on Likert Scale: The Implications for Educational Research." *Hong Kong Teachers' Centre Journal* 11: 121–130.

Tucker, B. 2012. "The Flipped Classroom." *Education Next* 12 (1): 82–83.

Walker, A. S. 2019. "Perusall: Harnessing AI Robo-Tools and Writing Analytics to Improve Student Learning and Increase Instructor Efficiency." *The Journal of Writing Analytics* 3: 227–263.

Weinberger, A., and F. Fischer. 2006. "A Framework to Analyze Argumentative Knowledge Construction in Computer-Supported Collaborative Learning." *Computers & Education* 46 1: 71–95.

Wells, M. J. C. 2011. "Framework-Based Approach to Teaching Principle-Based Accounting Standards." *Accounting Education: An International Journal* 20 (4): 303–316.

Wever, D. B., H. V. Keer, T. Schellens, and M. Valcke. 2007. "Applying Multilevel Modeling to Content Analysis Data: Methodological Issues in the Study of Role Assignment in Synchronous Discussion Groups." *Learning and Instruction* 17 (4): 436–447.

Wilburn, N. L., and B. G. Kilpatrick. 2020. "A Mini-Course Approach to Incorporate IFRS into the Accounting Curriculum." *Journal of the Academy of Business Education* 21: 32–46.

Woodward, J., and E. Neunaber. 2020. "Perusall: Digital Active Annotation Tool in ESL Reading Classes." *A Journal of Pedagogical Practices across Maryland Community Colleges* 34 (1): 13–14.

Xie, K., and F. Ke. 2011. "The Role of Students' Motivation in Peer-Moderated Asynchronous Online Discussions." *British Journal of Educational Technology* 42 (6): 916–930.

Yang, S. J., J. Zhang, A. Y. Su, and J. J. Tsai. 2011. "A Collaborative Multimedia Annotation Tool for Enhancing Knowledge Sharing in CSCL." *Interactive Learning Environments* 19 (1): 45–62.

Zhao, N., F. Gao, and D. Yang. 2018. "Examining Student Learning and Perceptions in Social Annotation-Based Translation Activities." *Interactive Learning Environments* 26 (7): 958–969.

Zhu, X., B. Chen, R. M. Avadhanam, H. Shui, and R. Z. Zhang. 2020. "Reading and Connecting: Using Social Annotation in Online Classes." *Information and Learning Sciences* 121 (5/6): 261–271

Zyto, S., D. Karger, M. Ackerman, and S. Mahajan. 2012. "Successful Classroom Deployment of a Social Document Annotation System." In: *Proceedings of the SIG CHI Conference on Human Factors in Computing Systems* (pp. 1883–1892).

5 CHAPTER 5: CONCLUSION

5.1 INTRODUCTION

The rapid evolution of the business environment as a result of technological advances and the globalisation of the world's economies (Bunney, Sharplin and Howitt 2015; Tan and Laswad 2018; Mustapha 2020), requires that professional accountants are equipped with a broad set of competencies (Chaplin 2017; Winterton and Turner 2019; Jackson and Meek 2021). To enable accounting students to develop these competencies, accounting education programmes adopted competency-based education programmes, informed by competency frameworks (see Certified Professional Accountants (CPA) Canada 2019; Association of Chartered Certified Accountants (ACCA) 2018; South African Institute of Chartered Accountants (SAICA) 2021) that identify the essential competencies expected of a professional accountant.

The philosophy of social constructivism is an important enabling learning theory (Vygotsky 1978; Nkhoma, Nkhoma and Tu 2018) in competency-based education (Schmulian and Coetzee 2019). It views learning as a social-based process, places the student at the centre of the learning process, and encourages active participation, interaction and dialogue to enable students to collaboratively engage in a process of knowledge construction.

In terms of the assessment component of competency-based education, in particular, these assessments should expand beyond the traditional psychometric assessments of learning (Boud 1990; Mustapha 2020; Schuwirth and Van der Vleuten 2020) to incorporate authentic 'assessments for learning' (Schuwirth and Van der Vleuten 2011; Ashford-Rowe, Herrington and Brown 2014; Van der Vleuten 2015; Siddiq, Gochyyev and Wilson 2017; Broadbent, Panadero and Boud 2018; Villarroel et al. 2020) that enable the development of students' competencies. These authentic assessments should in some way reflect the practice of the profession being assessed (Hart et al. 2011; Kearney 2013; Jopp 2020), through the use of work-related practical problems, challenges and complexities that are likely to be encountered in the work environment (Villarroel et al. 2020). The use of digital technology to support learning, or digital learning, can assist in providing authentic contexts for learning

and assessment tasks (Shaffer and Resnick 1999; McLoughlin and Luca 2002; Bozalek, Ng'ambi and Gachago 2013; Jopp 2020; Butler-Henderson and Crawford 2020).

In response to the need for competency-based accounting education and the development of competency-based authentic assessments for learning, this thesis contributes to existing accounting education literature by reporting on various approaches to authentic assessment and learning, enabled by digital technology, with the objective to promote social constructivist learning, and the development of selected student competencies.

In particular, this thesis, therefore:

1. Reported on the use of an authentic assessment to develop accounting students' digital creativity competence in an undergraduate competency-based accounting course. The design and development of the authentic assessment, an analysis of the students' digital creative outputs, as well as their reflections on developing these outputs, were specifically documented (Chapter 2: Research paper 1).
2. Considered the use of Mobile Instant Messaging (MIM) in assessments, to enable accounting students to socially construct knowledge and develop their collaborative problem solving competence. A dedicated Instant Messaging Assessment Tool (IMAT) was developed and implemented, and the extent, timing and content of the students' messages were analysed, before exploring the students' experiences of being able to use MIM while being assessed individually (Chapter 3: Research paper 2).
3. Reported on the use of an Online Social Annotation Platform (OSAP) as a computer supported collaborative learning (CSCL) tool to contribute towards developing accounting students' reading comprehension and their lifelong learning competence. The nature of the students' text-based interactions and level of collaboration while collaboratively reading and annotation their study material, as well as their broader experiences of using an OSAP, were specifically explored (Chapter 4: Research paper 3).

5.2 DEVELOPING DIGITAL CREATIVITY THROUGH AUTHENTIC ASSESSMENT (CHAPTER 2: RESEARCH PAPER 1)

Accounting professionals are increasingly expected to be creative in their roles as critical thinkers and problem solvers (Powell et al. 2020). The emerging domain of digital creativity involves the use of digital technology to reveal new ways of thinking and creates opportunities to communicate and present data and historical materials, like a company's financial report, in new and innovative ways (Lee and Chen 2015; University of York 2019). Integrating the development of students' digital creativity into accounting courses should, therefore, better prepare these students for future employment. While digital creativity has been explored from the perspective of domains traditionally perceived as creative (Lee and Chen 2015), it has not yet been explored in the accounting domain, which is traditionally perceived as being less creative. This thesis, therefore, contributes to the digital creativity and accounting education literature by reporting on the use of an authentic assessment designed and developed to enable accounting students' development of their digital creativity competence.

The authentic assessment designed and developed as part of this thesis, required the students to collaboratively research information about a real-world company, that may be relevant for inclusion in that company's financial report, and to communicate the results of their research through a digital creative output. The design and development of the assessment was informed by the eight critical design elements of an authentic assessment proposed by Ashford-Rowe, Herrington, and Brown (2014). The detailed description of the design and development of this assessment can inform the development of similar assessments by other accounting instructors for purposes of developing their own students' digital creativity competence.

The majority of the student teams' digital creative outputs displayed limited digital creativity competence. Despite this, the students were generally positive towards the assignment and many students suggested that they had gained deeper knowledge and understanding of the objective of financial reporting and appreciated the authenticity of the assessment. Based on the analysis of the student teams' digital creative outputs and the students' self-reported experiences of the assessment, it is suggested that the assessment met its objective of

exposing accounting students to the domain of digital creativity and providing them with an opportunity to develop their digital creativity competence.

The general lack of creativity displayed in the students' digital creative outputs deserves further discussion. Creativity is not conventionally associated with accounting, and the subject is often labelled as restricted and boring (Mladenovic 2000; Carnegie and Napier 2010; Krom and Williams 2011; McGowan 2012; Rossetto and Chapple 2019). There is a perception from students and society that accounting is an “uninteresting”, “conservative”, and “tedious” occupation that mainly focuses on technical knowledge and expertise (Dimnik and Felton 2006; Jeacle 2008; Bayerlein 2015, 674). More traditional teacher-centred teaching approaches that focuses on the mechanical bookkeeping aspects of accounting applied in introductory financial accounting courses (Coetzee and Schmulian 2012) often confirms and influences these negative stereotypes and the resultant career choices of aspirant students (Fisher and Murphy 1995; Mladenovic 2000). Consequently, professional accounting programmes often attract the ‘wrong’ type of student that exhibits personality traits associated with the traditional stereotype of accountants as only technical experts (Andon, Ming and Roebuck 2010; Bayerlein 2015). Innately creative students do not normally enrol for accounting programmes (Fisher and Murphy 1995; Mladenovic 2000). Despite considerable efforts by the accounting profession to change this perception (Jeacle 2008) as well as accounting education's transition to competency-based education and student-centred pedagogy (Abbasi 2013; Borgonovo, Friedrich and Wells 2019), it is submitted, based on the lack of creativity displayed in the students' digital creative outputs, that professional accounting programmes still largely attract the ‘wrong’ type of student.

To contest these negative perceptions and stereotypes associated with accounting education and the associated profession, it is critical that professional accounting programmes “create and encourage realistic perceptions about accounting if they are to attract students with qualities that are consistent with the demands of the accounting profession” (Mladenovic 2000, 136). Given that creativity is one of the most needed competencies of the 21st century workplace (World Economic Forum 2018), and that accountants are expected to be creative and innovative (Lawson et al. 2014; Birkey and Hausserman 2019; Powell et al. 2020), accounting instructors have to model creativity through their teaching and assessment practices and build creativity into their course design.

The authentic assessment designed and developed in this thesis to enable the development of accounting students' digital creativity competence is an example of how digital creativity can be modelled into accounting course design.

5.3 EMBRACING MOBILE INSTANT MESSAGING DURING ASSESSMENT (CHAPTER 3: RESEARCH PAPER 2)

In the work environment of professional accountants, collaborative problem solving is commonplace (McCloughlin and Luca 2002; Conde et al. 2020), and consequently collaborative problem solving is a widely coveted competence by employers (Care, Scoular and Griffin 2016; Organization for Economic Cooperation and Development (OECD) 2017; Fiore, Graesser and Greiff 2018; Mehrabi Boshraadi and Hosseini 2021). Based on the premise of collaborative learning (Kukulska-Hulme and Viberg 2018), it is submitted that accounting students' collaborative problem solving competence can be developed by allowing these students to collaborate with each other while being assessed.

MIM, which has the potential to facilitate the communications necessary for both collaborative learning (Kim, Lee and Kim 2014; Bere 2018; Kukulska-Hulme and Viberg 2018) and collaborative problem solving (Conde et al. 2020), can facilitate collaboration during assessments. The use of MIM in this regard, has, however, not yet been explored. This thesis, therefore, contributes to the collaborative learning and accounting education literature by reporting on the use of MIM by accounting students to enable the development of their collaborative problem solving competence.

This thesis specifically explored the extent, timing and communicative activities evident in the content of accounting students' MIM communications while being assessed individually. To enable this analysis, a dedicated instant messaging assessment tool (IMAT) was developed and implemented. Data, in the form of transcripts of the messages sent by the students using the IMAT, were collected during assessments of differing nature (e.g. essay style) and stake. Results revealed that the nature and the stakes of the assessments influenced the extent, timing, and content of the students' instant messaging communications. It is, therefore, suggested that instructors wanting to incorporate MIM into

assessments should consider the objective of those assessments together with the assessments' nature and stake.

Despite the opportunity, created by the use of MIM during assessments, for students to learn and develop their collaborative problem solving competence, many students did not demonstrate communicative activities at a level that extended knowledge or elicited problem solving, regardless of the assessment stakes involved. These results, therefore, suggested that students may need to be trained in being able to engage in communicative activities conducive to extending knowledge and problem solving, before being enabled to communicate while being assessed individually. The students' experiences of being able to use MIM during assessments were largely positive. In particular, the students appreciated the learning opportunities, and collaboration and teamwork afforded by MIM during the assessments. From the students' perspectives, MIM contributed to a sense of assessment authenticity, accessibility and equitability. The monitored use of MIM by accounting students, to authentically communicate during assessments, is an example of how the development of accounting students' collaborative problem solving competence can be modelled into accounting course design.

5.4 ANALYSIS OF STUDENTS' TEXT-BASED INTERACTIONS WHILE COLLABORATIVELY READING AND ANNOTATING FINANCIAL REPORTING STANDARDS (CHAPTER 4: RESEARCH PAPER 3)

The dynamic and fluid future world of work demands that professionals are able to learn and relearn through lifelong learning (McCloughlin and Luca 2002; Peters and Romero 2019; Schaefer et al. 2019; Lock et al. 2021). Reading comprehension, seen as gaining knowledge from written language, plays an important role in lifelong learning (Özdemir and Akyol 2019). The regular revision of financial reporting standards, the primary technical resource of most professional accountants, contributes to the fluidity of the accounting profession (Hilton and Johnstone 2013). To adequately prepare accounting students for this volatile and rapidly changing future world of work, accounting students should be enabled to read and interpret financial reporting standards (Hilton and Johnstone 2013). Being able to interpret and read financial reporting standards with comprehension are, therefore, a critical aspect in the development of accounting students' lifelong learning competence (Hilton and Johnstone

2013). Studies in domains other than accounting education found that engaging students in collaborative reading activities, using an OSAP (Novak, Razzouk and Johnson 2012; Gao 2013; Ghadirian, Salehi and Ayub 2018; Zhu et al. 2020), developed their ability to read written language, with comprehension (Johnson, Archibald and Tenenbaum 2010; Chen and Chen 2014; Keevy 2015; Chen, Li and Chen 2020; Chen, Chen and Horng 2021). The use of an OSAP has not yet been explored in the domain of accounting education nor for the collaborative annotation of a technical document, such as financial reporting standards. This thesis, therefore, contributes to the online social annotation and accounting education literature by reporting on the use of an OSAP to enable the development of accounting students' reading comprehension of financial reporting standards.

The success of the adoption of an OSAP to enable students to develop their ability to read with comprehension is, however, dependent on how students behave and interact while collaboratively reading and annotating a document (Kreijns, Kirschner and Jochems 2003; Murphy 2004; Gao 2013; Adams and Wilson 2020). This thesis, therefore, explored the nature of accounting students' text-based interactions with each other when collaboratively reading and annotating the content of a financial reporting standard using an OSAP, with the objective to identify the level of collaboration evident in their text-based interactions.

Using Murphy's (2004) collaboration model to analyse the level of collaboration evident in the students' text-based interactions, it became apparent that the majority of the annotations satisfied the indicators of asking and answering questions. More students asked questions to clarify their understanding of the content of the financial reporting standard being read, with fewer students responding to questions asked. Student annotations were also often characterised by monologues and summaries of the content read in an attempt to meet the required number of annotations specified for the associated reading assignment. This placed the majority of the students' interactions at the *articulating individual perspectives* and *co-constructing shared perspectives and meanings* stages of the model. The level of interaction, using the OSAP, demonstrated the level of collaboration necessary to meet the objective of the reading assignment.

The students remarked that their use of an OSAP enabled them to collaborate and interact with their peers, motivated them to read the financial reporting standards in preparation for

class, improved their understanding of the financial reporting standards, and allowed them to clarify the meaning of words and phrases. Consequently, it was concluded that the effective implementation of authentic digital learning in the form of an OSAP in a financial reporting classroom to improve accounting students' ability to read with comprehension, contributed towards the development of the students' lifelong learning competence and their ability to learn and relearn financial reporting standards as future professional accountants. The use of an OSAP by accounting students, to authentically discuss the content of their study material is, therefore, an example of how the development of accounting students' lifelong learning competence can be modelled into accounting course design.

5.5 SUMMARY

Rapid changes in the business environment as a result of technological advances and the globalisation of the worlds' economies requires that professional accountants are equipped with a broader set of competencies. As a result, the accounting profession has developed several competency frameworks to inform the accounting education programmes. Achieving the goals of competency-based education requires a robust, holistic, programmatic approach to assessment, incorporating authentic assessments for learning that enable the development of competencies, rooted in the theory of social constructivism. This thesis reported on various approaches to authentic assessment and learning, enabled by digital technologies, in an undergraduate competency-based accounting course, with the objective to promote collaborative student-centred learning and the development of accounting students' competencies.

The **social constructivist** approach to each of these authentic assessments encouraged active learning in a social manner and the development of accounting students' competencies that may have previously been ignored as they may be difficult to measure, such as digital creativity, collaborative problem solving and lifelong learning. Teamwork, as a form of collaboration, may be a useful form of social constructivist learning. Through collaboratively developing a digital creative output as a team, the students learned from each other and the peer feedback provided in the process, gained deeper and more practical insights of the objective of financial reporting, and developed their digital creativity competence. Being enabled to communicate with each other during assessments exposed

the students to the perspectives of others, which enhanced their understanding and knowledge of the technical content being assessed, and developed their collaborative problem solving competence. Students explaining the content of their study material to each other, while collaboratively reading and annotating financial reporting standards, improved their understanding of IFRS, and developed their lifelong learning competence. Results from this thesis, therefore, provides evidence that social constructivism is relevant and applicable in the domain of accounting education (Mapuya 2021) and does allow for student-centred pedagogy that contributes towards meaningful knowledge construction.

As a central theme to this thesis, **authentic assessments**, enabled by **digital technologies**, that move beyond the rote learning of technical knowledge, played an important role in enabling the development of accounting students' competencies. Having students communicate financial information of a real-world company in a digital creative manner exposed the students to the possibilities afforded by the use of digital technologies to present financial information in ways not previously possible and developed their digital creativity competence. Professional accountants solve problems in teams. Allowing accounting students to collaboratively solve problems by incorporating MIM into assessments, as a form of digital learning, assisted the students in learning authentically and developed their collaborative problem solving competence. Professional accountants must be able to read financial reporting standards with comprehension, not only as students but throughout their careers. The implementation of an OSAP, as a form of digital learning, in a financial reporting classroom developed accounting students' lifelong learning competence and their ability to learn and relearn financial reporting standards as future professional accountants. This thesis, therefore, provides evidence that adding an authentic element to assessments promoted learning (Villarroel et al. 2020) and provided effective support for the development of accounting students' competencies. This thesis further provides examples of how digitally enabled authentic assessments can be modelled into accounting course design, particularly for large student cohorts.

A further compelling finding that emerged from this thesis, and merits further discussion, is accounting students' continued fixation on grades. Though it was not the intended focus of the research, analysis of the students' work, online interactions and experiences indicated that the students often focused on their grades for the assessment as opposed to embracing

the intended value of the associated collaborative learning opportunity afforded. When developing a digital creative output in teams, students repeatedly requested clearer guidance in the form of exemplars, favouring a more instructor-directed approach (DeFeo, Tran and Gerken 2021), while the authentic assessment was specifically designed to challenge the students and provide them with an opportunity to showcase their own ideas, without being influenced by exemplars. Student engagement, while using MIM during assessments, were notably lower when the associated assessment stakes were elevated, suggesting that the students were more focused on documenting their individual answers for grading purposes as opposed to embracing the opportunity to develop their collaborative problem solving competence. A large number of student annotations, while using an OSAP, were primarily made because of the required number of annotations for grading purposes, with limited interaction with other students.

It is submitted that this fixation on grades hindered engagement to some extent as some students foregrounded their grades over their learning (DeFeo, Tran and Gerken 2021). These observations illuminate the dilemma between prescribing activities and ensuring that students take them up as meaningful activities, often plaguing student-centred pedagogical approaches (Taylor 2015; Akçayır and Akçayır 2018). This fixation on grades could further suggest that the students are not yet mindful of the significant transformation that is taking place in the 21st century and associated business environment together with its inevitable effect on the future of the accounting profession – students are not yet consciously embracing the development of much needed competencies and the associated learning opportunities afforded.

Even though students' fixation on grades is evident, the importance of grades to students should not be disregarded or ignored (DeFeo, Tran and Gerken 2021). Instructors should rather emphasise the relevance and importance of collaboration elements incorporated into assessments to encourage students to not only fixate on grades but also embrace the intended learning opportunities presented. As student motivation is regarded as a crucial factor to the success of collaborative learning (Xie and Ke 2011; Mega, Ronconi and De Beni 2014; DeFeo, Tran and Gerken 2021), accounting instructors aspiring to implement student-centred authentic assessments should, therefore, intentionally motivate and monitor their students to ensure meaningful engagement and collaboration. This dilemma,

specifically in the accounting education domain, has not yet been resolved in the literature and remains an area for future research.

In conclusion, within a programme of assessments, various competencies can and should be developed over time, informed by a competency framework. The development of these competencies should be monitored, as part of a programmatic approach to assessment, across several assessment data points using various assessment instruments. The approaches to digital learning and authentic assessment and learning reported in this thesis only represent a sample of what could be included in a larger programme of assessments in a competency-based accounting education environment.

5.6 CONTRIBUTION

There is little to no literature exploring:

1. The development of digital creativity competence in the domain of accounting education.
2. The use of mobile instant messaging by accounting students for collaborative learning and problem solving while being assessed individually.
3. The nature of accounting students' interactions and level of collaboration when using an online social annotation platform to read International Financial Reporting Standards.

This thesis, therefore, makes an independent and original contribution to knowledge in respect of specific approaches to digital learning and authentic assessment in competency-based accounting education namely, developing accounting students' digital creativity competence through an authentic assessment, the use of MIM during assessments to develop accounting students' collaborative problem solving competence and the use of an OSAP by accounting students to collaboratively read and annotate IFRS in a large real-world financial reporting classroom to develop the students' lifelong learning competence.

In particular, this thesis provides insights into:

1. The levels of digital integration and creativity evident in students' digital creative outputs.

2. The students' experiences of the authentic assessment that required them to collaboratively develop a digital creative output.
3. The extent, timing and communicative activities evident in the content of the students' MIM communications while being assessed individually.
4. The students' experiences of being able to use MIM while being assessed individually;
5. The nature of students' text-based interactions with each other, using an OSAP, while collaboratively reading and annotating the content of a financial reporting standard.
6. The students' experiences of using an OSAP, while collaboratively reading and annotating a financial reporting standard.

In addition, this thesis makes the following specific contributions to the digital learning and authentic assessment literature:

1. Provides a detailed description of the design and development of the authentic assessment, informed by literature, to enable other instructors to use this, or a similar, assessment in other settings for purposes of developing their students' digital creativity competence.
2. Provides a detailed description of the development and implementation of a dedicated instant messaging assessment tool as well as an open-access template of the IMAT to inform the use of MIM during assessments in other disciplinary settings.
3. Provides a description of the use and implementation of an online social annotation platform in a large real-world financial reporting classroom to enable students to collaboratively read and annotate a technical document, and, in particular, financial reporting standards.

Overall, this thesis contributes to existing accounting and higher education literature by providing evidence that adding a digitally enabled authentic element to assessments in a competency-based environment can promote learning and can contribute to the development of accounting students' competence. Further, this thesis illustrates how the development of these competencies can be modelled into accounting course design.

5.7 LIST OF REFERENCES

- Abbasi, N. 2013. "Competency Approach to Accounting Education: A global view." *Journal of Finance and Accountancy* 13 (1): 1–18.
- Adams, B., and N. S. Wilson. 2020. "Building Community in Asynchronous Online Higher Education Courses Through Collaborative Annotation." *Journal of Educational Technology Systems* 49 (2): 250–261.
- Akçayır, G., and M. Akçayır. 2018. "The Flipped Classroom: A review of its Advantages and Challenges." *Computers & Education* 126: 334–345.
- Andon, P., C. K. Ming, and P. Roebuck. 2010. "Personality Preferences of Accounting and Non-Accounting Graduates Seeking to Enter the Accounting Profession." *Critical Perspectives on Accounting* 21 (4): 253–265.
- Ashford-Rowe, K., J. Herrington, and C. Brown. 2014. "Establishing the Critical Clements that Determine Authentic Assessment." *Assessment & Evaluation in Higher Education* 39 (2): 205–222.
- Association of Chartered Certified Accountants (ACCA). 2018. "ACCA Career Navigator." Accessed 9 September 2022. <https://careernavigator.accaglobal.com/gb/en.html>
- Bayerlein, L. 2015. "Curriculum Innovation in Undergraduate Accounting Degree Programmes through 'Virtual Internships'." *Education + Training* 57 (6): 673–684.
- Bere, A. 2018. "Applying an Extended Task-Technology Fit for Establishing Determinants of Mobile Learning: An Instant Messaging Initiative." *Journal of Information Systems Education* 29 (4): 239–252.

Birkey, R., and C. Hausserman. 2019. "Inducing Creativity in Accountants' Task Performance: The Effects of Background, Environment, and Feedback." In: *Advances in Accounting Education: Teaching and Curriculum Innovations*. Emerald Publishing Limited.

Borgonovo, A., B. Friedrich, and M. Wells. 2019. "Competency-Based Accounting Education, Training, and Certification: An Implementation Guide." The World Bank.

Boud, D. 1990. "Assessment and the Promotion of Academic Values." *Studies in Higher Education* 15 (1): 101–111.

Bozalek, V., D. Ng'ambi, and D. Gachago. 2013. "Transforming Teaching with Emerging Technologies: Implications for Higher Education Institutions." *South African Journal of Higher Education* 27 (2): 419–436.

Broadbent, J., E. Panadero, and D. Boud. 2018. "Implementing Summative Assessment with a Formative Flavour: A Case Study in a Large Class." *Assessment & Evaluation in Higher Education* 43 (2): 307–322.

Bunney, D., E. Sharplin, and C. Howitt. 2015. "Generic Skills for Graduate Accountants: the Bigger Picture, a Social and Economic Imperative in the New Knowledge Economy." *Higher Education Research & Development* 34 (2): 256–269.

Butler-Henderson, K., and J. Crawford. 2020. "A Systematic Review of Online Examinations: A Pedagogical Innovation for Scalable Authentication and Integrity." *Computers & Education*: 104024.

Care, E., C. Scoular, and P. Griffin. 2016. "Assessment of Collaborative Problem Solving in Education Environments." *Applied Measurement in Education* 29 (4): 250–264.

Carnegie, G. D., and C. J. Napier. 2010. "Traditional Accountants and Business Professionals: Portraying the Accounting Profession after Enron." *Accounting, Organizations and Society* 35 (3): 360–376.

Certified Professional Accountants (CPA) Canada. 2019. "The CPA Competency Map." Accessed 8 September 2022. <https://www.cpacanada.ca/-/media/site/become-a-cpa/docs/competencymap.pdf>

Chaplin, S. 2017. "Accounting Education and the Prerequisite Skills of Accounting Graduates: are Accounting Firms Moving the Boundaries?." *Australian Accounting Review* 27 (1): 61–70.

Chen, C. M., and F. Y. Chen. 2014. "Enhancing Digital Reading Performance with a Collaborative Reading Annotation System." *Computers & Education* 77: 67–81.

Chen, C. M., L. C. Chen, and W. J. Horng. 2021. "A Collaborative Reading Annotation System with Formative Assessment and Feedback Mechanisms to Promote Digital Reading Performance." *Interactive Learning Environments* 29 (5): 848–865.

Chen, C. M., M. C. Li, and T. C. Chen. 2020. "A Web-Based Collaborative Reading Annotation System with Gamification Mechanisms to Improve Reading Performance." *Computers & Education* 144: 103697.

Coetzee, S. A., and A. Schmulian. 2012. "A Critical Analysis of the Pedagogical Approach Employed in an Introductory Course to IFRS." *Issues in Accounting Education* 27 (1): 83–100.

Conde, M. Á., F. J. Rodríguez-Sedano, F. J. Rodríguez-Lera, A. Gutiérrez-Fernández, and Á. M. Guerrero-Higueras. 2020. "Assessing the Individual Acquisition of Teamwork Competence by Exploring Students' Instant Messaging Tools Use: The WhatsApp Case Study." *Universal Access in the Information Society*: 1–10.

DeFeo, D. J., T. C. Tran, and S. Gerken, S. 2021. "Mediating Students' Fixation with Grades in an Inquiry-Based Undergraduate Biology Course." *Science & Education* 30 (1): 81–102.

Dimnik, T., and S. Felton. 2006. "Accountant Stereotypes in Movies Distributed in North America in the Twentieth Century." *Accounting, Organizations and Society* 31 (2): 129–155.

Fiore, S. M., A. Graesser, and S. Greiff. 2018. "Collaborative Problem-Solving Education for the Twenty-First-Century Workforce." *Nature Human Behaviour* 2 (6): 367–369.

Fisher, R., and V. Murphy. 1995. "A Pariah Profession? Some Student Perceptions of Accounting and Accountancy." *Studies in Higher Education* 20 (1): 45–58.

Gao, F. 2013. "A Case Study of Using a Social Annotation Tool to Support Collaboratively Learning." *The Internet and Higher Education* 17: 76–83.

Ghadirian, H., K. Salehi, and A. F. M. Ayub. 2018. "Social Annotation Tools in Higher Education: A Preliminary Systematic Review." *International Journal of Learning Technology* 13 (2): 130–162.

Hart, C., S. Hammer, P. Collins, and T. Chardon. 2011. "The Real Deal: Using Authentic Assessment to Promote Student Engagement in the First and Second Years of a Regional law Program." *Legal Education Review* 21: 97–121.

Hilton, S. R., and N. Johnstone. 2013. "The IFRS Transition and Accounting Education: A Canadian Perspective Post-Transition." *Issues in Accounting Education* 28 (2): 253–261.

Jackson, D., and S Meek. 2021. "Embedding Work-Integrated Learning into Accounting Education: The State of Play and Pathways to Future Implementation." *Accounting Education* 30 (1): 63–85.

Jeacle, I. 2008. "Beyond the Boring Grey: The Construction of the Colourful Accountant." *Critical Perspectives on Accounting* 19 (4): 1296–1320.

Johnson, T. E., T. N. Archibald, and G. Tenenbaum. 2010. "Individual and Team Annotation Effects on Students' Reading Comprehension, Critical Thinking, and Meta-Cognitive Skills." *Computers in Human Behavior* 26 (6): 1496–1507

Jopp, R. 2020. "A Case Study of a Technology Enhanced Learning Initiative that Supports Authentic Assessment." *Teaching in Higher Education* 25 (8): 942–958.

Kearney, S. 2013. "Improving Engagement: The Use of 'Authentic Self- and Peer-Assessment for Learning' to Enhance the Student Learning Experience." *Assessment & Evaluation in Higher Education* 38 (7): 875–891.

Keevy, M. 2015. "Using Collaborative Learning Exercises to Transfer Pervasive Skills: Some South African Evidence." *Journal of Economic and Financial Sciences* 8 (2): 456–473.

Kim, H., M. Lee, and M. Kim. 2014. "Effects of Mobile Instant Messaging on Collaborative Learning Processes and Outcomes: The Case of South Korea." *Journal of Educational Technology & Society* 17 (2): 31–42.

Kreijns, K., P. A. Kirschner, and W. Jochems. 2003. "Identifying the Pitfalls for Social Interaction in Computer-Supported Collaborative Learning Environments: A Review of the Research." *Computers in Human Behavior* 19 (3): 335–353.

Krom, C. L., and S. V. Williams. 2011. "Tell Me a Story: Using Creative Writing in Introductory Accounting Courses to Enhance and Assess Student Learning." *Journal of Accounting Education* 29 (4): 234–249.

Kukulska-Hulme, A., and O. Viberg. 2018. "Mobile Collaborative Language Learning: State of the Art." *British Journal of Educational Technology* 49 (2): 207–218.

Lawson, R. A., E. J. Blocher, P. C. Brewer, G. Cokins, J. E. Sorensen, D. E. Stout, G. L. Sundem, S. K. Wolcott, and M. J. Wouters. 2014. "Focusing Accounting Curricula on Students' Long-Run Careers: Recommendations for an Integrated Competency-Based Framework for Accounting Education." *Issues in Accounting Education* 29 (2): 295–317.

Lee, M. R., and T. T. Chen. 2015. "Digital Creativity: Research Themes and Framework." *Computers in Human Behavior* 42: 12–19.

Lock, J., S. Lakhal, M. Cleveland-Innes, P. Arancibia, D. Dell, and N. De Silva, N. 2021. "Creating Technology-Enabled Lifelong Learning: A Heutagogical Approach." *British Journal of Educational Technology* 52 (4): 1646–1662.

Mapuya, M. 2021. "First-Year Accounting Student Teachers' Constructivist Learning Experiences, the Lecturer's Role and Implications for Curriculum Implementation." *International Journal of Learning, Teaching and Educational Research* 20 (1): 103–119.

McGowan, S. 2012. "Going Beyond the Numbers in Teaching Financial Accounting: The Newsletter as an Assignment Option." *Issues in Accounting Education* 27 (4): 1095–1117.

McLoughlin, C., and J. Luca. 2002. "A Learner–Centred Approach to Developing Team Skills through Web–Based Learning and Assessment." *British Journal of Educational Technology* 33 (5): 571–582.

Mega, C., L. Ronconi, and R. De Beni. 2014. "What Makes a Good Student? How Emotions, Self-Regulated Learning, and Motivation Contribute to Academic Achievement". *Journal of Educational Psychology* 106 (1): 121–131.

Mehrabi Boshrahadi, A., and M. R. Hosseini. 2021. "Designing Collaborative Problem Solving Assessment Tasks in Engineering: An Evaluative Judgement Perspective." *Assessment & Evaluation in Higher Education* 46 (6): 913–927.

Mladenovic, R. 2000. "An Investigation into Ways of Challenging Introductory Accounting Students' Negative Perceptions of Accounting." *Accounting Education* 9 (2): 135–155.

Murphy, E. 2004. "Recognising and Promoting Collaboration in an Online Asynchronous Discussion." *British Journal of Educational Technology* 35 (4): 421–431.

Mustapha, R. B., 2020. "Future Assessment in Higher Education: Reframing Conventional Practices." *Horizon* 2 (1): 19–34.

Nkhoma, C., M. Nkhoma, and L. K. Tu. 2018. "Authentic Assessment Design in Accounting Courses: A Literature Review." *Issues in Informing Science and Information Technology* 15 (1): 157–190.

Novak, E., R. Razzouk, and T. E. Johnson. 2012. "The Educational Use of Social Annotation Tools in Higher Education: A Literature Review." *The Internet and Higher Education* 15 (1): 39–49.

Organization for Economic Cooperation and Development (OECD). 2017. "PISA 2015 Collaborative Problem-Solving Framework." Accessed 30 November 2021. <http://tiny.cc/accouz>

Özdemir, E. Ç., and H. Akyol. 2019. "The Development of a Reading Comprehension Test." *Universal Journal of Educational Research* 7 (2): 563–570.

Peters, M., and M. Romero. 2019. "Lifelong Learning Ecologies in Online Higher Education: Students' Engagement in the Continuum Between Formal and Informal Learning." *British Journal of Educational Technology* 50 (4): 1729–1743.

Powell, L., D. Lambert, N. McGuigan, A. Prasad, and J. Lin. 2020. "Fostering Creativity in Audit through Co-Created Role-Play." *Accounting Education* 29 (6): 605–639.

Rossetto, C., and S. Chapple. 2019. "Creative Accounting? The Critical and Creative Voice of Students." *Assessment & Evaluation in Higher Education* 44 (2): 216–232.

Schaefer, T., J. Rahn, T. Kopp, C. M. Fabian, and A. Brown. 2019. "Fostering Online Learning at the Workplace: A Scheme to Identify and Analyse Collaboration Processes in Asynchronous Discussions." *British Journal of Educational Technology* 50 (3): 1354–1367.

Schmulian, A., and S. A. Coetzee. 2019. "Students' Experience of Team Assessment with Immediate Feedback in a Large Accounting Class." *Assessment & Evaluation in Higher Education* 44 (4): 516–532.

Schuwirth, L. W., and C. P. Van der Vleuten. 2011. "Programmatic Assessment: From Assessment of Learning to Assessment for Learning." *Medical Teacher* 33 (6): 478–485.

Schuwirth, L. W., and C. P. Van der Vleuten. 2020. "A History of Assessment in Medical Education." *Advances in Health Sciences Education* 25 (5): 1045–1056.

Shaffer, D. W., and M. Resnick. 1999. "'Thick' Authenticity: New Media and Authentic Learning." *Journal of Interactive Learning Research* 10 (2): 195–216.

Siddiq, F., P. Gochyyev, and M. Wilson. 2017. "Learning in Digital Networks–ICT Literacy: A Novel Assessment of Students' 21st Century Skills." *Computers & Education* 109: 11–37.

South African Institute of Chartered Accountants (SAICA). 2021. CA(SA) Competency framework. Accessed 9 September 2022. <https://bit.ly/3RXRAYg>

Tan, L. M., and F. Laswad. 2018. "Professional Skills Required of Accountants: What do Job Advertisements Tell Us?" *Accounting Education* 27 (4): 403–432.

Taylor, A. 2015. "Flipping Great or Flipping Useless? A Review of the Flipped Classroom Experiment at Coventry University London Campus." *Journal of Pedagogic Development* 5 (3): 57–65

University of York. 2019. "Digital Creativity." Accessed 5 March 2021. <https://subjectguides.york.ac.uk/skills/digital-creativity>

Van der Vleuten, C. P. 2015. "Competency-Based Education is Beneficial for Professional Development." *Perspectives on Medical Education* 4 (6): 323–325.

Villarroel, V., D. Boud, S. Bloxham, D. Bruna, and C. Bruna. 2020. "Using Principles of Authentic Assessment to Redesign Written Examinations and Tests." *Innovations in Education and Teaching International* 57 (1): 38–49.

Vygotsky, L. S. 1978. *Mind in Society: The Development of Higher Psychological Processes*, edited by M. Cole, V. John-Steiner, V. Scribner, and S.E. Souberman. Cambridge, MA: Harvard University Press.

Winterton, J., and J. J. Turner. 2019. "Preparing Graduates for Work Readiness: An Overview and Agenda." *Education + Training* 61 (5): 536–551.

World Economic Forum. 2018. "The Future of Jobs Report 2018". Accessed 9 September 2022. http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf

Xie, K., and F. Ke. 2011. "The Role of Students' Motivation in Peer-Moderated Asynchronous Online Discussions." *British Journal of Educational Technology* 42 (6): 916–930.

Zhu, X., B. Chen, R. M. Avadhanam, H. Shui, and R. Z. Zhang. 2020. "Reading and Connecting: Using Social Annotation in Online Classes." *Information and Learning Sciences* 121 (5/6): 261–271

COMBINED LIST OF REFERENCES

- Abbasi, N. 2013. "Competency Approach to Accounting Education: A global view." *Journal of Finance and Accountancy* 13 (1): 1–18.
- Adams, B., and N. S. Wilson. 2020. "Building Community in Asynchronous Online Higher Education Courses Through Collaborative Annotation." *Journal of Educational Technology Systems* 49 (2): 250–261.
- Adie, L. E., L. Hee, and L. Wharton. 2010. "Incorporating Authentic Assessment into Different University Learning Scenarios." In: *Emerging Trends in Higher Education Learning and Teaching: Proceedings of the TARC International Conference on Learning and Teaching* (pp. 82–90). Tunku Abdul Rahman College.
- Ahmed, S., and D. Parsons. 2013. "Abductive Science Inquiry Using Mobile Devices in the Classroom." *Computers & Education* 63: 62–72.
- Akçayır, G., and M. Akçayır. 2018. "The Flipped Classroom: A review of its Advantages and Challenges." *Computers & Education* 126: 334–345.
- Albrecht, W. S., D. C. Clark, J. M. Smith, K. D. Stocks, and L. W. Woodfield. 1994. "An Accounting Curriculum for the Next Century." *Issues in Accounting Education* 9 (2): 401–425.
- Albrecht, W., and R. Sack. 2000. *Accounting education: Charting the course through a perilous future*. Accounting Education Series, Vol. No. 16. Sarasota: American Accounting Association, Florida
- Alexander, G. 1992. "Designing Human Interfaces for Collaborative Learning." In: A. R. Kaye (ed) *Collaborative Learning Through Computer Conferencing: The Najaden Papers*. Springer-Verlag, New York: 201–210.

Andon, P., C. K. Ming, and P. Roebuck. 2010. "Personality Preferences of Accounting and Non-Accounting Graduates Seeking to Enter the Accounting Profession." *Critical Perspectives on Accounting* 21 (4): 253–265.

Arquero, J. L., and E. Romero-Frías. 2013. "Using Social Network Sites in Higher Education: An Experience in Business Studies." *Innovations in Education and Teaching International* 50 (3): 238–249.

Ashford-Rowe, K., J. Herrington, and C. Brown. 2014. "Establishing the Critical Elements that Determine Authentic Assessment." *Assessment & Evaluation in Higher Education* 39 (2): 205–222.

Association of Chartered Certified Accountants (ACCA). 2018. "ACCA Career Navigator." Accessed 9 September 2022. <https://careernavigator.accaglobal.com/gb/en.html>

Baartman, L. K., T. J. Bastiaens, P. A. Kirschner, and C. P. Van der Vleuten. 2007. "Evaluating Assessment Quality in Competence-Based Education: A Qualitative Comparison of Two Frameworks." *Educational Research Review* 2 (2): 114–129.

Baker, P. 2019. "An Experiment Using Two Methods of Teaching Accounting for Leases in Intermediate Accounting." *The Journal of Applied Business and Economics* 21 (6): 25–31.

Baril, C. P., B. M. Cunningham, D. R. Fordham, R. L. Gardner, and S. K. Wolcott. 1998. "Critical Thinking in the Public Accounting Profession: Aptitudes and Attitudes." *Journal of Accounting Education* 16 (3-4): 381–406.

Barth, M. E. 2008. "Global Financial Reporting: Implications for U.S. Academics." *Accounting Review* 83 (5): 1159–1179.

Bayerlein, L. 2015. "Curriculum Innovation in Undergraduate Accounting Degree Programmes through 'Virtual Internships'." *Education + Training* 57 (6): 673–684.

Baygin, M., H. Yetis, M. Karakose, and E. Akin. 2016. "An Effect Analysis of Industry 4.0 to Higher Education." *15th International Conference on Information Technology Based Higher Education and Training (ITHET)* 1–4.

Bere, A. 2018. "Applying an Extended Task-Technology Fit for Establishing Determinants of Mobile Learning: An Instant Messaging Initiative." *Journal of Information Systems Education* 29 (4): 239–252.

Bergmann, J., and A. Sams. 2012. "Flip Your Classroom: Reach Every Student in Every Class Every Day." *International Society for Technology in Education*.

Birkey, R., and C. Hausserman. 2019. "Inducing Creativity in Accountants' Task Performance: The Effects of Background, Environment, and Feedback." In: *Advances in Accounting Education: Teaching and Curriculum Innovations*. Emerald Publishing Limited.

Bolt-Lee, C., and S. Foster. 2003. "The Core Competency Framework: A New Element in the Continuing Call for Accounting Education Change in the United States." *Accounting Education* 12 (1): 33–47.

Borgonovo, A., B. Friedrich, and M. Wells. 2019. "Competency-Based Accounting Education, Training, and Certification: An Implementation Guide." The World Bank.

Boritz, J. E., C. A. Carnaghan. 2003. "Competency-Based Education and Assessment for the Accounting Profession: A Critical Review." *Canadian Accounting Perspectives* 2 (1):7–42.

Boud, D. 1990. "Assessment and the Promotion of Academic Values." *Studies in Higher Education* 15 (1): 101–111.

Boud, D. 2000. "Sustainable Assessment: Rethinking Assessment for the Learning Society." *Studies in Continuing Education* 22 (2): 151–167.

Boud, D., and N. Falchikov. 2006. "Aligning Assessment with Long-Term Learning." *Assessment & Evaluation in Higher Education* 31 (4): 399–413.

Bozalek, V., D. Ng'ambi, and D. Gachago. 2013. "Transforming Teaching with Emerging Technologies: Implications for Higher Education Institutions." *South African Journal of Higher Education* 27 (2): 419–436.

Broadbent, J., E. Panadero, and D. Boud. 2018. "Implementing Summative Assessment with a Formative Flavour: A Case Study in a Large Class." *Assessment & Evaluation in Higher Education* 43 (2): 307–322.

Brown, J. S., A. Collins, and P. Duguid. 1989. "Situated Cognition and the Culture of Learning." *Educational Researcher* 18 (1): 32–42.

Brown, C. A., K. Danvers, and D. T. Doran. 2016. "Student Perceptions on Using Guided Reading Questions to Motivate Student Reading in the Flipped Classroom." *Accounting Education* 25 (3): 256–271.

Brown, S. 2005. "Assessment for Learning." *Learning and Teaching in Higher Education* 1: 81–89.

Bryant, S. M., D. Stone, and B. Wier. 2011. "An Exploration of Accountants, Accounting Work, and Creativity." *Behavioral Research in Accounting* 23 (1): 45–64.

Bunney, D., E. Sharplin, and C. Howitt. 2015. "Generic Skills for Graduate Accountants: The Bigger Picture, a Social and Economic Imperative in the New Knowledge Economy." *Higher Education Research & Development* 34 (2): 256–269.

Butler-Henderson, K., and J. Crawford. 2020. "A Systematic Review of Online Examinations: A Pedagogical Innovation for Scalable Authentication and Integrity." *Computers & Education*: 104024.

Care, E., C. Scoular, and P. Griffin. 2016. "Assessment of Collaborative Problem Solving in Education Environments." *Applied Measurement in Education* 29 (4): 250–264.

Carnegie, G. D., and C. J. Napier. 2010. "Traditional Accountants and Business Professionals: Portraying the Accounting Profession after Enron." *Accounting, Organizations and Society* 35 (3): 360–376.

Castrillon, C. 2020. "This is the Future of Remote Work in 2021." *Forbes*, December 27. Accessed 29 November 2021. <https://bit.ly/3xfZmoz>

Cecchinato, G., and L. C. Foschi. 2020. "Perusall: University Learning-Teaching Innovation Employing Social Annotation and Machine Learning." *Qwerty-Open and Interdisciplinary Journal of Technology, Culture and Education* 15 (2): 45–67.

Certified Professional Accountants (CPA) Canada. 2019. "The CPA Competency Map." Accessed 8 September 2022. <https://www.cpacanada.ca/-/media/site/become-a-cpa/docs/competencymap.pdf>

Chaplin, S. 2017. "Accounting Education and the Prerequisite Skills of Accounting Graduates: are Accounting Firms Moving the Boundaries?." *Australian Accounting Review* 27 (1): 61–70.

Chen, C. M., and F. Y. Chen. 2014. "Enhancing Digital Reading Performance with a Collaborative Reading Annotation System." *Computers & Education* 77: 67–81.

Chen, C. M., L. C. Chen, and W. J. Horng. 2021. "A Collaborative Reading Annotation System with Formative Assessment and Feedback Mechanisms to Promote Digital Reading Performance." *Interactive Learning Environments* 29 (5): 848–865.

Chen, J. M., M. C. Chen and Y. S. Sun. 2010. "A Novel Approach for Enhancing Student Reading Comprehension and Assisting Teacher Assessment of Literacy." *Computers & Education* 55 (3): 1367–1382.

Chen, B., B. Hussein, and O. Poquet, O. 2021. "Modelling Network Dynamics in Social Annotation." In: *Proceedings of the NetSciLA21 workshop*.

Chen, C. M., M. C. Li and T. C. Chen. 2020. "A Web-Based Collaborative Reading Annotation System with Gamification Mechanisms to Improve Reading Performance." *Computers & Education* 144: 103697.

Chhinzer, N., and A. Russo. 2018. "An Exploration of Employer Perceptions of Graduate Student Employability." *Education + Training* 60 (1): 104–120.

Chi, M. T., P. J. Feltovich, and R. Glaser. 1981. "Categorization and Representation of Physics Problems by Experts and Novices." *Cognitive Science* 5 (2): 121–152.

Choudhury, P. 2020. November-December 2020. "Our Work-From-Anywhere-Future." Business Harvard Review. Accessed November 29 2021. <https://hbr.org/2020/11/our-work-from-anywhere-future>

Christie, B. 2003. "Designing Online Courses to Discourage Dishonesty." *Educause Quarterly* 26 (4): 54–58.

Clarke, A. J. 2021. "Perusall: Social Learning Platform for Reading and Annotating (Perusall LLC, Perusall. com)." *Journal of Political Science Education* 17 (1): 149–154.

Clarke, L. W., and A. Bartholomew. 2014. "Digging Beneath the Surface: Analyzing the Complexity of Instructors' Participation in Asynchronous Discussion." *Online Learning* 18 (3): n3.

Coetzee, S. A., C. Janse van Rensburg, and A. Schmulian. 2016. "Differences in Students' Reading Comprehension of International Financial Reporting Standards: A South African Case." *Accounting Education* 25 (4): 306–326.

Coetzee, S. A., and A. Schmulian. 2011. "A Mixed Methods Pedagogical Approach to an Introductory Course to IFRS." *Accounting Instructors Report* Winter: 1–7.

Coetzee, S. A., and A. Schmulian. 2012. "A Critical Analysis of the Pedagogical Approach Employed in an Introductory Course to IFRS." *Issues in Accounting Education* 27 (1): 83–100.

Coetzee, S. A., and A. Schmulian. 2013. "The effect of IFRS adoption on financial reporting pedagogy in South Africa." *Issues in Accounting Education* 28 (2): 243–251.

Coetzee, S. A., A. Schmulian, and L. Kotze. 2014. "Communication Apprehension of South African Accounting Students: The Effect of Culture and Language." *Issues in Accounting Education* 29 (4): 505–525.

Cohen, L., L. Manion, and K. Morrison. 2017. *Research Methods in Education*. Routledge.

Collins, A. 1988. "Cognitive Apprenticeship and Instructional Technology." *Technical Report*. No 6899, Cambridge, MA: BBN Labs Inc.

Conde, M. Á., F. J. Rodríguez-Sedano, F. J. Rodríguez-Lera, A. Gutiérrez-Fernández, and Á. M. Guerrero-Higueras. 2020. "Assessing the Individual Acquisition of Teamwork Competence by Exploring Students' Instant Messaging Tools Use: the WhatsApp Case Study." *Universal Access in the Information Society*: 1–10.

Cooper, S. 2017. "A Collaborative Assessment of Students' Placement Learning." *Assessment & Evaluation in Higher Education* 42 (1): 61–76.

Coutinho, C., and E. Lisboa. 2014. "Collaboration in Virtual Environments: A Study of Interactions in a Social Network." In: *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 421–428). Association for the Advancement of Computing in Education (AACE).

Cumming, J., and G. S. Maxwell. 1999. "Contextualising Authentic Assessment." *Assessment in Education: Principles, Policy and Practice* 6 (2): 177–194.

Daffin Jr, L. W., and A. A. Jones. 2018. "Comparing Student Performance on Proctored and Non-Proctored Exams in Online Psychology Courses." *Online Learning* 22 (1): 131–145.

Damon, W., and E. Phelps. 1989. "Critical Distinctions among Three Approaches to Peer Education." *International Journal of Educational Research* 13 (1): 9–19.

De Boer, V. 2020. "Stimulating Students' Interactions and Improving the Quality of Annotations in a Social Annotation Tool by Scaffolding through Collaboration Scripts." Master's Thesis. Open Universiteit.

Deegan, C., and J. Unerman. 2006. *Financial Accounting Theory: European Edition*. Maidenhead: McGraw-Hill.

DeFeo, D. J., T. C. Tran, and S. Gerken, S. 2021. "Mediating Students' Fixation with Grades in an Inquiry-Based Undergraduate Biology Course." *Science & Education* 30 (1): 81–102.

Deloitte. 2019. "The Path to Prosperity: Why the Future of Work is Human."

Denicolo, P. 2016. "Constructivist Approaches and Research Methods: A Practical Guide to Exploring Personal Meanings. SAGE. Accessed 4 February 2023. <https://methods.sagepub.com/book/constructivist-approaches-and-research-methods>

Dillenbourg, P., and F. Fischer. 2007. "Basics of Computer-Supported Collaborative Learning." *Zeitschrift für Berufs- und Wirtschaftspädagogik* 21: 111–130

Dillman, D. A., J. D. Smyth, and L. M. Christian. 2014. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. New Jersey: John Wiley and Sons, Inc.

Dimnik, T., and S. Felton. 2006. "Accountant Stereotypes in Movies Distributed in North America in the Twentieth Century." *Accounting, Organizations and Society* 31 (2): 129–155.

Douglas, S., and E. Gammie. 2019. "An Investigation into the Development of Non-Technical Skills by Undergraduate Accounting Programmes." *Accounting Education* 28 (3): 304–332.

ECDL Foundation. 2012. "The Role of Digital Proficiency as a 21st Century Competence." Accessed 5 March 2021. <https://bit.ly/3Dkcv3W>

Ellington, P. 2017. "The Impediments to the Change to UK University Accounting Education, a Comparison to the USA Pathways Commission." *Accounting Education* 26 (5–6): 576–598.

Entwistle, N. 2009. *Teaching for Understanding at University: Deep Approaches and Distinctive Ways of Thinking*. London, UK: Palgrave Macmillan.

Falkner, K., and N. J. Falkner. 2012. "Supporting and Structuring 'Contributing Student Pedagogy' in Computer Science Curricula." *Computer Science Education* 22 (4): 413–443.

Farrell, C. 2020. "Do International Marketing Simulations Provide an Authentic Assessment of Learning? A Student Perspective." *The International Journal of Management Education* 18 (1): 100362.

Fattah, S. F. E. S. A. 2015. "The Effectiveness of Using WhatsApp Messenger as One of Mobile Learning Techniques to Develop Students' Writing Skills." *Journal of Education and Practice* 6 (32): 115–127.

Feiden, G. 2015. "Pilot Study Assessing Student Perception of the Collaborative Annotation Platform Open Rev in a Classroom Environment. In: Uppsala Workshop on Pedagogical Research Projects. Uppsala University, Uppsala, Sweden.

Feintzeig, R. 2020. "The Vanishing Executive Assistant." *The Wall Street Journal*. Accessed 5 March 2021. <https://www.wsj.com/articles/the-vanishing-executive-assistant-11579323605>

Fiore, S. M., A. Graesser, and S. Greiff. 2018. "Collaborative Problem-Solving Education for the Twenty-First-Century Workforce." *Nature Human Behaviour* 2 (6): 367–369.

Fisher, R., and V. Murphy. 1995. "A Pariah Profession? Some Student Perceptions of Accounting and Accountancy." *Studies in Higher Education* 20 (1): 45–58.

Forsyth, H., and J. Evans. 2019. "Authentic Assessment for a More Inclusive History." *Higher Education Research and Development* 38 (4): 748–761.

Fosnacht, K., S. Sarraf, E. Howe, and L. K. Peck. 2017. "How Important are High Response Rates for College Surveys?" *The Review of Higher Education* 40 (2): 245–265.

Frank, J. R., L. S. Snell, O. T. Cate, E. S. Holmboe, C. Carraccio, S. R. Swing, ... and R. M. Harden. 2010. "Competency-Based Medical Education: Theory to Practice." *Medical Teacher* 32 (8): 638–645.

Freeman, S., S. L. Eddy, M. McDonough, M. K. Smith, N. Okoroafor, H. Jordt, and M. P. Wenderoth. 2014. "Active Learning Increases Student Performance in Science, Engineering, and Mathematics." *Proceedings of the National Academy of Sciences*. 111 (23): 8410–8415.

Gao, F. 2013. "A Case Study of Using a Social Annotation Tool to Support Collaboratively Learning." *The Internet and Higher Education* 17: 76–83.

Garrison, D. R., T. Anderson, and W. Archer. 2000. "Critical Inquiry in a Text-Based Environment: Computer Conferencing in Higher Education." *The Internet and Higher Education* 2 (2-3): 87–105.

Gehringer, E. F., and B. W. Peddycord. 2013. "Experience with Online and Open-Web Exams." *Journal of Instructional Research* 2: 10–18.

Ghadirian, H., K. Salehi, and A. F. M. Ayub. 2018. "Social Annotation Tools in Higher Education: A Preliminary Systematic Review." *International Journal of Learning Technology* 13 (2): 130–162.

Ghani, E. K., and K. Muhammad. 2019. "Industry 4.0: Employers' Expectations of Accounting Graduates and Its Implications on Teaching and Learning Practices." *International Journal of Education and Practice* 7 (1): 19–29.

Gold, R. L. 1958. "Roles in Sociological Field Observations." *Social Forces* 36 (3): 217–223.

Gray, A. 2016. "The 10 Skills You Need to Thrive in the Fourth Industrial Revolution." Accessed 5 March 2021. <https://www.weforum.org/agenda/2016/01/the-10-skills-you-need-to-thrive-in-the-fourth-industrial-revolution>

Greene, J. A., S. B. Yu, and D. Z. Copeland. 2014. "Measuring Critical Components of Digital Literacy and their Relationships with Learning." *Computers & Education* 76: 55–69.

Gulikers, J. T., L. Kester, P. A. Kirschner, and T. J. Bastiaens. 2008. "The Effect of Practical Experience on Perceptions of Assessment Authenticity, Study Approach, and Learning Outcomes." *Learning and Instruction* 18 (2): 172–186.

Gulikers, J. T., T. J. Bastiaens, and P. A. Kirschner. 2004. "A Five-Dimensional Framework for Authentic Assessment." *Educational Technology Research and Development* 52 (3): 67.

Gulikers, J. T., T. J. Bastiaens, and P. A. Kirschner. 2006. "Authentic Assessment, Student and Teacher Perceptions: The Practical Value of the Five-Dimensional Framework." *Journal of Vocational Education and Training* 58 (3): 337–357.

Hamilton, E. R., J. M. Rosenberg, and M. Akcaoglu. 2016. "The Substitution Augmentation Modification Redefinition (SAMR) Model: A Critical Review and Suggestions for its Use." *TechTrends* 60 (5): 433–441.

Han, F., and R. A. Ellis. 2019. "Identifying Consistent Patterns of Quality Learning Discussions in Blended Learning." *The Internet and Higher Education* 40: 12–19.

Harris P., L. Snell, M. Talbot, R. M. Harden, and International CBME Collaborators. 2010. "Competency-Based Medical Education: Implications for Undergraduate Programs." *Medical Teacher* 32 (8): 646–650.

Harris, P., F. Bhanji, M. Topps, S. Ross, S. Lieberman, J. R. Frank, ... and ICBME Collaborators. 2017. "Evolving Concepts of Assessment in a Competency-Based World." *Medical Teacher* 39 (6): 603–608.

Hart, C., S. Hammer, P. Collins, and T. Chardon. 2011. "The Real Deal: Using Authentic Assessment to Promote Student Engagement in the First and Second Years of a Regional law Program." *Legal Education Review* 21: 97–121.

Hattie, J. 2012. *Visible learning for teachers: Maximizing impact on learning*. London: Routledge.

Henri, F. 1995. Distance Learning and Computer-Mediated Communication: Interactive, Quasi-Interactive or Monologue? In: O'Malley., C. (ed) *Computer Supported Collaborative Learning*. Berlin: Springer-Verlag: 145–164.

Hilton, S. R., and N. Johnstone. 2013. "The IFRS Transition and Accounting Education: A Canadian Perspective Post-Transition." *Issues in Accounting Education* 28 (2): 253–261.

Hines, R. D. 1988. "Financial Accounting: in Communicating Reality, We Construct Reality." *Accounting, Organizations and Society* 13 (3): 251–261.

Hodgdon, C., S. Hughes, and D. Street. 2011. "Framework-Based Teaching of IFRS Judgements." *Accounting Education: An International Journal* 20 (4): 415–439.

Huang, H. M., U. Rauch, and S. S. Liaw. 2010. "Investigating Learners' Attitudes Toward Virtual Reality Learning Environments: Based on a Constructivist Approach." *Computers & Education* 55 (3): 1171–1182.

Husserl, E. [1900] 2002. Logical investigations. Translated by J.M. Findlay. London: Routledge

Hwang, G. J., C. L. Lai, and S. Y. Wang. 2015. "Seamless Flipped Learning: A Mobile Technology-Enhanced Flipped Classroom with Effective Learning Strategies." *Journal of Computers in Education* 2: 449–473.

Hwang, W. Y., C. Y. Wang, and M. Sharples. 2007. "A Study of Multimedia Annotation of Web-Based Materials." *Computers & Education* 48 (4): 680–699.

Ibarra Sáiz, M. S., G. Rodríguez Gómez, D. Boud, T. Rotsaert, S. Brown, M. L. Salinas, and H. M. Rodríguez Gómez. (2020). "The Future of Assessment in Higher Education." *Relieve* 26 (1).

International Accounting Standards Board (IASB). 2018. The Conceptual Framework for Financial Reporting. London: IFRS Foundation.

International Financial Reporting Standards (IFRS) Foundation. 2021. "IFRS Foundation Work Plan." Accessed 9 September 2022. <https://www.ifrs.org/projects/work-plan/>

International Financial Reporting Standards (IFRS) Foundation. 2022a. "IFRS Foundation Work Plan." Accessed 9 September 2022. <https://www.ifrs.org/projects/work-plan/>

International Financial Reporting Standards (IFRS) Foundation. 2022b. "Who Uses IFRS Accounting Standards?" Accessed 8 March 2022. <https://www.ifrs.org/use-around-the-world/use-of-ifrs-standards-by-jurisdiction/#analysis-of-the-166-profiles>

Jackson, D., and S Meek. 2021. "Embedding Work-Integrated Learning into Accounting Education: The State of Play and Pathways to Future Implementation." *Accounting Education* 30 (1): 63–85.

James, L. T., and R. Casidy. 2018. "Authentic Assessment in Business Education: its Effects on Student Satisfaction and Promoting Behaviour." *Studies in Higher Education* 43 (3): 401–415.

Jamieson, S. 2004. "Likert Scales: How to (ab) use them?" *Medical Education* 38 (12): 1217–1218.

Jang, H., N. Lasry, K. Miller, and E. Mazur. 2017. "Collaborative Exams: Cheating? Or Learning?" *American Journal of Physics* 85 (3): 223–227.

Janse van Rensburg, C., S. A. Coetzee, and A. Schmulian. 2014. "South African Financial Reporting Students' Reading Comprehension of the IASB Conceptual Framework." *Journal of Accounting Education* 32 (4): 1–15.

Janse van Rensburg, C., S. A. Coetzee, and A. Schmulian. 2021. "Developing Digital Creativity Through Authentic Assessment." *Assessment & Evaluation in Higher Education* 1–21.

Jantjies, M., and M. Joy. 2015. "Mobile Enhanced Learning in a South African Context." *Journal of Educational Technology & Society* 18 (1): 308–320.

Jeacle, I. 2008. "Beyond the Boring Grey: The Construction of the Colourful Accountant." *Critical Perspectives on Accounting* 19 (4): 1296–1320.

Jeong, A. C. 2003. "The Sequential Analysis of Group Interaction and Critical Thinking in Online." *The American Journal of Distance Education* 17 (1): 25–43.

Johnson, T. E., T. N. Archibald, and G. Tenenbaum. 2010. "Individual and Team Annotation Effects on Students' Reading Comprehension, Critical Thinking, and Meta-Cognitive Skills." *Computers in Human Behavior* 26 (6): 1496–1507

Jonassen, D., M. Davidson, M. Collins, J. Campbell, and B. B. Haag. 1995. "Constructivism and Computer-Mediated Communication in Distance Education." *American Journal of Distance Education* 9 (2): 7–26.

Jonassen, D., T. Mayes, and R. McAleese. 1993. A Manifesto for a Constructivist Approach to Uses of Technology in Higher Education. In: Duffy, T., J. Lowyck, and D. Jonassen (eds) *Designing Environments for Constructive Learning*. Berlin: Springer-Verlag: 231–247.

Jopp, R. 2020. "A Case Study of a Technology Enhanced Learning Initiative that Supports Authentic Assessment." *Teaching in Higher Education* 25 (8): 942–958.

Junco, R., and S. R. Cotten. 2011. "Perceived Academic Effects of Instant Messaging Use." *Computers & Education* 56 (2): 370–378.

Kalir, J. 2020. "Social Annotation Enabling Collaboration for Open Learning." *Distance Education* 1–16.

Kay, A. E., J. Hardy, and R. K. Galloway. 2020. "Student use of PeerWise: A Multi-Institutional, Multidisciplinary Evaluation." *British Journal of Educational Technology* 51 (1): 23–35.

Kearney, S. 2013. "Improving Engagement: The Use of 'Authentic Self- and Peer-Assessment for Learning' to Enhance the Student Learning Experience." *Assessment & Evaluation in Higher Education* 38 (7): 875–891.

Keevy, M. 2015. "Using Collaborative Learning Exercises to Transfer Pervasive Skills: Some South African Evidence." *Journal of Economic and Financial Sciences* 8 (2): 456–473.

Keshmiri, F., R. Gandomkar, S. M. Hejri, E. Mohammadi, and A. Mirzazadeh. 2019. "Developing a Competency Framework for Health Professions Education at Doctoral Level: The First Step Toward a Competency Based Education." *Medical Teacher* 41 (11): 1298–1306.

Kiili, C., L. Laurinen, M. Marttunen, and D. J. Leu. 2012. "Working on Understanding During Collaborative Online Reading." *Journal of Literacy Research* 44 (4): 448–483.

Kim, H., M. Lee, and M. Kim. 2014. "Effects of Mobile Instant Messaging on Collaborative Learning Processes and Outcomes: The Case of South Korea." *Journal of Educational Technology & Society* 17 (2): 31–42.

Knuth, B. A., and D. J. Cunningham. 1993. Tools for Constructivism. In: Duffy, T., J. Lowyck, and D. Jonassen D (eds) *Designing Environments for Constructive Learning*. Berlin: Springer-Verlag: 164–188

Kreijns, K., P. A. Kirschner, and W. Jochems. 2003. "Identifying the Pitfalls for Social Interaction in Computer-Supported Collaborative Learning Environments: A Review of the Research." *Computers in Human Behavior* 19 (3): 335–353.

Krom, C. L., and S. V. Williams. 2011. "Tell Me a Story: Using Creative Writing in Introductory Accounting Courses to Enhance and Assess Student Learning." *Journal of Accounting Education* 29 (4): 234–249.

Krosnick, J. A. 1999. "Survey Research." *Annual Review of Psychology* 50 (1): 537–567.

Krosnick, J. A., and L. R. Fabrigar. 1997. Designing Rating Scales for Effective Measurement in Surveys. In: Lyberg, L., B. Paul, M. Collins, E. De Leeuw, C. Dippo, N. Schwarz, and D. Trewin (eds.), *Survey Measurement and Process Quality* (pp. 141-164). New York: John Wiley and Sons, Inc.

Kukulska-Hulme, A., and O. Viberg. 2018. "Mobile Collaborative Language Learning: State of the Art." *British Journal of Educational Technology* 49 (2): 207–218.

Larmer, J., J. Mergendoller, and S. Boss. 2015. *Setting the Standard for Project Based Learning*. Alexandria: ASCD.

Lave, J., and E. Wenger. 1991. *Situated Learning: Legitimate Peripheral Participation*. Cambridge University Press.

Lawson, R. A., E. J. Blocher, P. C. Brewer, G. Cokins, J. E. Sorensen, D. E. Stout, G. L. Sundem, S. K. Wolcott, and M. J. Wouters. 2014. "Focusing Accounting Curricula on Students' Long-Run Careers: Recommendations for an Integrated Competency-Based Framework for Accounting Education." *Issues in Accounting Education* 29 (2): 295–317.

Lee, M. R., and T. T. Chen. 2015. "Digital Creativity: Research Themes and Framework." *Computers in Human Behavior* 42: 12–19.

Lento, C. 2016. "Promoting Active Learning in Introductory Financial Accounting Through the Flipped Classroom Design." *Journal of Applied Research in Higher Education* 8 (1): 72–87.

Li, L., F. Gao, and S. Guo. 2020. "The Effects of Social Messaging on Students' Learning and Intrinsic Motivation in Peer Assessment." *Journal of Computer Assisted Learning* 36 (4): 439–448.

Lock, J., S. Lakhal, M. Cleveland-Innes, P. Arancibia, D. Dell, and N. De Silva, N. 2021. "Creating Technology-Enabled Lifelong Learning: A Heutagogical Approach." *British Journal of Educational Technology* 52 (4): 1646–1662.

Long, T., J. Cummins, and M. Waugh. 2017. "Use of the Flipped Classroom Instructional Model in Higher Education: Instructors' Perspectives." *Journal of Computing in Higher Education* 29: 179–200.

Low, M., G. Samkin, and C. Liu. 2013. "Accounting Education and the Provision of Soft Skills: Implications of the Recent NZICA CA Academic Requirement Changes." *E-journal of Business Education and Scholarship of Teaching* 7 (1): 1–33.

Lu, J., and L. Deng. 2013. "Examining Students' Use of Online Annotation Tools in Support of Argumentative Reading." *Australasian Journal of Educational Technology* 29 (2).

Malone, K., and S. Supri. 2012. "A Critical Time for Medical Education: The Perils of Competence-Based Reform of the Curriculum." *Advances in Health Sciences Education* 17 (2): 241–246.

Mapuya, M. 2021. "First-Year Accounting Student Teachers' Constructivist Learning Experiences, the Lecturer's Role and Implications for Curriculum Implementation." *International Journal of Learning, Teaching and Educational Research* 20 (1): 103–119.

Matthew, S. M., H. G. Bok, K. P. Chaney, E. K. Read, J. L. Hodgson, B. R. Rush, ... and L. K Molgaard. 2020. "Collaborative Development of a Shared Framework for Competency-Based Veterinary Education." *Journal of Veterinary Medical Education* 47 (5): 578–593.

Maxwell, T. W. 2012. "Assessment in Higher Education in the Professions: Action Research as an Authentic Assessment Task." *Teaching in Higher Education* 17 (6): 686–696.

McDowall, T., and B. Jackling. 2010. "Attitudes towards the accounting profession: an Australian perspective". *Asian Review of Accounting* 18 (1): 30–49.

McGowan, S. 2012. "Going Beyond the Numbers in Teaching Financial Accounting: The Newsletter as an Assignment Option." *Issues in Accounting Education* 27 (4): 1095–1117.

McKenzie, J. F., M. L. Wood, J. E. Kotecki, J. K. Clark, and R. A. Brey. 1999. "Establishing Content Validity: Using Qualitative and Quantitative Steps." *American Journal of Health Behavior* 23 (4): 311–318.

McLoughlin, C., and J. Luca. 2002. "A Learner–Centred Approach to Developing Team Skills through Web–Based Learning and Assessment." *British Journal of Educational Technology* 33 (5): 571–582.

Mega, C., L. Ronconi, and R. De Beni. 2014. "What Makes a Good Student? How Emotions, Self-Regulated Learning, and Motivation Contribute to Academic Achievement". *Journal of Educational Psychology* 106 (1): 121–131.

Mehrabi Boshrabadi, A., and M. R. Hosseini. 2021. "Designing Collaborative Problem Solving Assessment Tasks in Engineering: An Evaluative Judgement Perspective." *Assessment & Evaluation in Higher Education* 46 (6): 913–927.

Mendenhall, A., and T. E. Johnson. 2010. "Fostering the Development of Critical Thinking Skills, and Reading Comprehension of Undergraduates Using a Web 2.0 Tool Coupled with a Learning System." *Interactive Learning Environments* 18 (3): 263–276.

Miller, K., B. Lukoff, G. King, and E. Mazur. 2018. "Use of a Social Annotation Platform for Pre-class Reading Assignments in a Flipped Introductory Physics Class." *Frontiers in Education* (3).

Miller, K., S. Zyto, D. Karger, J. Yoo, and E. Mazur. 2016. "Analysis of Student Engagement in an Online Annotation System in the Context of a Flipped Introductory Physics Class." *Physical Review Physics Education Research* 12 (2): 1–12.

Milliron, V., and K. Sandoe. 2008. "The Net Generation Cheating Challenge." *Innovate: Journal of Online Education* 4 (6): 3.

Mladenovic, R. 2000. "An Investigation into Ways of Challenging Introductory Accounting Students' Negative Perceptions of Accounting." *Accounting Education* 9 (2): 135–155.

Murphy, E. 2004. "Recognising and Promoting Collaboration in an Online Asynchronous Discussion." *British Journal of Educational Technology* 35 (4): 421–431.

Mustapha, R. B., 2020. "Future Assessment in Higher Education: Reframing Conventional Practices." *Horizon* 2 (1): 19–34.

Nieminen, J. H., M. Bearman, and R. Ajjawi. 2022. "Designing the Digital in Authentic Assessment: is it Fit for Purpose?" *Assessment & Evaluation in Higher Education* 1–15.

Nkhoma, C., M. Nkhoma, and L. K. Tu. 2018. "Authentic Assessment Design in Accounting Courses: A Literature Review." *Issues in Informing Science and Information Technology* 15 (1): 157–190.

Nokelainen, P., J. Kurhila, M. Miettinen, P. Floréen, and H. Tirri. 2003. "Evaluating the Role of a Shared Document-Based Annotation Tool in Learner-Centered Collaborative Learning." In: *Proceedings 3rd IEEE International Conference on Advanced Technologies* (pp. 200–203). IEEE.

Norman, G., J. Norcini, and G. Bordage. 2014. "Competency-Based Education: Milestones or Millstones?" *Journal of Graduate Medical Education* 6 (1): 1–6.

Northrup, P. 2001. "A Framework for Designing Interactivity into Web-Based Instruction." *Educational Technology* 41 (2): 31–39.

Novak, E., R. Razzouk, and T. E. Johnson. 2012. "The Educational Use of Social Annotation Tools in Higher Education: A Literature Review." *The Internet and Higher Education* 15 (1): 39–49.

O'Connell, B., G. D. Carnegie, A. J. Carter, P. Hancock, C. V. Helliard, and K. Watty. 2015. "Shaping the Future of Accounting in Business Education in Australia." Melbourne: CPA Australia.

Olson, E. D., and E. Brown. 2018. "Perceptions of Students in an Event Management Program of Annotation Systems and their Influence on Student Learning." *Journal of Hospitality and Tourism Education* 30 (2): 118–126.

Opdecam, E., P. Everaert, H. Van Keer, and F. Buysschaert. 2014. "Preferences for Team Learning and Lecture-Based Learning among First-Year Undergraduate Accounting Students." *Research in Higher Education* 55 (4): 400–432.

Organization for Economic Cooperation and Development (OECD). 2017. "PISA 2015 Assessment and Analytical Framework." Accessed 30 November 2021. <http://tiny.cc/accouz>

Osborne, R., E. Dunne, and P. Farrand. 2013. "Integrating Technologies into "Authentic" Assessment Design: An Affordances Approach." *Research in Learning Technology* 21.

Özdemir, E. Ç., and H. Akyol. 2019. "The Development of a Reading Comprehension Test." *Universal Journal of Educational Research* 7 (2): 563–570.

Pardo, L. S. 2004. "What Every Teacher Needs to Know About Comprehension." *International Reading Association* 58 (3): 272–280.

Partnership for 21st Century Skills. 2015. "Century Skills – Core Content Integration." Accessed 9 September 2022. <https://bit.ly/3dIMSF0>

Pathways Commission. 2015. "The Pathways Commission: in Pursuit of Accounting's Curricula of the Future." American Accounting Association. Accessed 18 April 2021 <https://aaahq.org/Portals/0/images/education/Pathways/15-9-61866.pdf?ver=2021-02-23-175219-123>

Pena-Shaff, J. B., and C. Nicholls. 2004. "Analyzing Student Interactions and Meaning Construction in Computer Bulletin Board Discussions." *Computers & Education* 42 (3): 243–265.

Peters, M., and M. Romero. 2019. "Lifelong Learning Ecologies in Online Higher Education: Students' Engagement in the Continuum Between Formal and Informal Learning." *British Journal of Educational Technology* 50 (4): 1729–1743.

Phillips, A. W., S. Reddy, and S. J. Durning. 2016. "Improving Response Rates and Evaluating Nonresponse Bias in Surveys: AMEE Guide No. 102." *Medical Teacher* 38 (3): 217–228.

Pimmer, C., and P. Rambe. 2018. "The Inherent Tensions of "Instant Education": A Critical Review of Mobile Instant Messaging." *International Review of Research in Open and Distributed Learning* 19 (5): 217–237.

Pimmer, C., F. Brühlmann, T. D. Odetola, D. O. Oluwasola, O. Dipeolu, and A. J. Ajuwon. 2019. "Facilitating Professional Mobile Learning Communities with Instant Messaging." *Computers & Education* 128: 102–112.

Pinho, K. 2015. "Deloitte to Launch Career Education Program at Cornerstone Schools." Accessed 5 March 2021. <https://bit.ly/3Bc2xPc>

Plant, K., K. Barac, and G. Sarens. 2019. "Preparing Work-Ready Graduates – Skills Development Lessons Learnt from Internal Audit Practice." *Journal of Accounting Education* 48: 33–47.

Pornel, J. B., and G. A. Saldaña. 2013. "Four Common Misuses of the Likert Scale." *Philippine Journal of Social Sciences and Humanities University of the Philippines Visayas* 18 (2): 12–19.

Porter-O'Donnell, C. 2004. "Beyond the Yellow Highlighter: Teaching Annotation Skills to Improve Reading Comprehension." *English Journal* 82–89.

Powell, L., D. Lambert, N. McGuigan, A. Prasad, and J. Lin. 2020. "Fostering Creativity in Audit through Co-Created Role-Play." *Accounting Education* 29 (6): 605–639.

Puccio, G. 2017. "Creativity: A Skill to Cultivate In the 21st Century." Accessed 5 March 2021. <https://www.developintelligence.com/blog/2017/09/creativity-skill-cultivate-21st-century/>

PuenteDura, R. 2014. "Building Transformation: An Introduction to the SAMR Model." Accessed 18 April 2021. <https://bit.ly/3U1cCHm>

Rambe, P., and A. Bere. 2013. "Using Mobile Instant Messaging to Leverage Learner Participation and Transform Pedagogy at a South African University of Technology." *British Journal of Educational Technology* 44 (4): 544–561.

Razon, S., J. Turner, T. E. Johnson, G. Arsal, and G. Tenenbaum. 2012. "Effects of a Collaborative Annotation Method on Students' Learning and Learning-Related Motivation and Affect." *Computers in Human Behavior* 28 (2): 350–359.

Rieger, G. W., and C. E. Heiner. 2014. "Examinations that Support Collaborative Learning: The Students' Perspective." *Journal of College Science Teaching* 43 (4): 41–47.

Rodríguez, A. I., B. G. Riaza, and M. C. S. Gómez. 2017. "Collaborative Learning and Mobile Devices: An Educational Experience in Primary Education." *Computers in Human Behavior* 72: 664–677.

Rossetto, C., and S. Chapple. 2019. "Creative Accounting? The Critical and Creative Voice of Students." *Assessment & Evaluation in Higher Education* 44 (2): 216–232.

Saab, N., W. R. Van Joolingen, and B. H. Van Hout-Wolters. 2005. "Communication in Collaborative Discovery Learning." *British Journal of Educational Psychology* 75 (4): 603–621.

Saemann, G. P., and K. J. Crooker. 1999. "Student Perceptions of the Profession and its Effect on Decisions to Major in Accounting." *Journal of Accounting Education* 17 (1): 1–22.

Samuel, R. D., C. Kim, and T. E. Johnson. 2011. "A Study of a Social Annotation Modelling Learning System." *Journal of Educational Computing Research* 45 (1): 117–137.

Saxena, S. 2013. "How Technology Can Support Authentic Learning." Accessed 7 February 2023. <https://bit.ly/3YIBUeU>

Schaefer, T., J. Rahn, T. Kopp, C. M. Fabian, and A. Brown. 2019. "Fostering Online Learning at the Workplace: A Scheme to Identify and Analyse Collaboration Processes in Asynchronous Discussions." *British Journal of Educational Technology* 50 (3): 1354–1367.

Schmulian, A. 2018. "Approaches to Social Constructivist Accounting Education". Doctoral Dissertation, University of Pretoria.

Schmulian, A., and S. A. Coetzee. 2019. "Students' Experience of Team Assessment with Immediate Feedback in a Large Accounting Class." *Assessment & Evaluation in Higher Education* 44 (4): 516–532.

Schrage, M. 1995. *No More Teams! Mastering the Dynamics of Creative Collaboration*. New York: Doubleday.

Schuwirth, L. W., and C. P. Van der Vleuten. 2011. "Programmatic Assessment: From Assessment of Learning to Assessment for Learning." *Medical Teacher* 33 (6): 478–485.

Schuwirth, L. W., and C. P. Van der Vleuten. 2020. "A History of Assessment in Medical Education." *Advances in Health Sciences Education* 25 (5): 1045–1056.

Schwab, K. 2016. "The Fourth Industrial Revolution: What it Means, How to Respond." Accessed 5 March 2021. <https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/>

Shaffer, D. W., and M. Resnick. 1999. "'Thick' Authenticity: New Media and Authentic Learning." *Journal of Interactive Learning Research* 10 (2): 195–216.

Shan, J., and W. Wang. 2021. "Making and Sharing in Asynchronous Discussion: Exploring the Collaboration Process in Online Maker Community." *Interactive Learning Environments* 1–15.

Siddiq, F., P. Gochyyev, and M. Wilson. 2017. "Learning in Digital Networks–ICT Literacy: A Novel Assessment of Students' 21st Century Skills." *Computers & Education* 109: 11–37.

Silva, I. L. 2018. "How Learning Theories can be Applied in Accounting Education." *Millenium-Journal of Education, Technologies, and Health* 7: 13–20.

Silva, V. L., J. L. Kovalski, R. N. Pagani, A. Corsi, and M. A. S. Gomes. 2020. "Human Factor in Smart Industry: A Literature Review." *Future Studies Research Journal: Trends and Strategies* 12 (1): 1.

Sisttermans, I. J. 2020. "Integrating Competency-Based Education with a Case-Based or Problem-Based Learning Approach in Online Health Sciences." *Asia Pacific Education Review* 21 (4): 683–696.

Sithole, B. M., and L. Pereira. 2019. "Towards Constructivist Learning and Teaching in Accounting Education." *Journal of Emerging Trends in Educational Research and Policy Studies* 10 (1): 1–9.

So, S. 2016. "Mobile Instant Messaging Support for Teaching and Learning in Higher Education." *The Internet and Higher Education* 31: 32–42.

Sotiriadou, P., D. Logan, A. Daly, and R. Guest. 2020. "The role of authentic assessment to preserve academic integrity and promote skill development and employability." *Studies in Higher Education* 45 (11): 2132–2148.

South African Institute of Chartered Accountants (SAICA). 2021. "CA(SA) Competency Framework." Accessed 9 September 2022. <https://bit.ly/3RXRAYq>

Stanley, T., and S. Marsden. 2012. "Problem-Based Learning: Does Accounting Education Need It?" *Journal of Accounting Education* 30 (3–4): 267–289.

Statista. 2020. "Internet User Penetration in South Africa from 2015 to 2025.' Accessed 5 March 2021. <https://www.statista.com/statistics/484933/internet-user-reach-south-africa/>

Steigrad, A. 2021. September 7. "Facebook Reads and Shares WhatsApp Private Messages: Report." The New York Post. Accessed 30 September 2021. <https://nypost.com/2021/09/07/facebook-reads-and-shares-whatsapp-private-messages-report/>

Strobel, J., J. Wang, N. R. Weber, and M. Dyehouse. 2013. "The Role of Authenticity in Design-Based Learning Environments: The Case of Engineering Education." *Computers & Education* 64: 143–152.

Su, A. Y., S. J. Yang, W. Y. Hwang, and J. Zhang. 2010. "A Web 2.0-Based Collaborative Annotation System for Enhancing Knowledge Sharing in Collaborative Learning Environments." *Computers & Education* 55 (2): 752–766.

Suhre, C., K. Winnips, V. De Boer, P. Valdivia, and H. Beldhuis. 2019. "Students' Experiences with the Use of a Social Annotation Tool to Improve Learning in Flipped Classrooms." In: 5th International Conference on Higher Education Advances (pp. 955–962). Universitat Politècnica de Valencia.

Sullivan, G. M., and A. R. Artino Jr. 2013. "Analyzing and Interpreting Data from Likert-Type Scales." *Journal of Graduate Medical Education* 5 (4): 541–542.

Sun, Y., and F. Gao. 2017. "Comparing the Use of a Social Annotation Tool and a Threaded Discussion Forum to Support Online Discussions." *The Internet and Higher Education* 32: 72–79.

Sun, Z., C. H. Lin, M. Wu, J. Zhou, and L. Luo. 2018. "A Tale of Two Communication Tools: Discussion-Forum and Mobile Instant-Messaging Apps in Collaborative Learning." *British Journal of Educational Technology* 49 (2): 248–261.

Tabary, Z. 2015. "The Skills Agenda: Preparing Students for the Future." Economist Impact. Accessed 29 September 2021. <https://perspectives.eiu.com/talent-education/driving-skills-agenda/blog/skills-agenda-preparing-students-future>

Tan, L. M., and F. Laswad. 2018. "Professional Skills Required of Accountants: what do Job Advertisements Tell Us?" *Accounting Education* 27 (4): 403–432.

Tang, Y., and K. F. Hew. 2017. "Is Mobile Instant Messaging (MIM) Useful in Education? Examining its Technological, Pedagogical, and Social Affordances." *Educational Research Review* 21: 85–104.

Tay, L., and A. T. Jebb. 2018. "Establishing Construct Continua in Construct Validation: The Process of Continuum Specification." *Advances in Methods and Practices in Psychological Science* 1 (3): 375–388.

Taylor, A. 2015. "Flipping Great or Flipping Useless? A Review of the Flipped Classroom Experiment at Coventry University London Campus." *Journal of Pedagogic Development* 5 (3): 57–65

Ten Cate, O., and S. Billett. 2014. "Competency-Based Medical Education: Origins, Perspectives and Potentialities." *Medical Education* 48 (3): 325–332.

Timmis, S., P. Broadfoot, R. Sutherland, and A. Oldfield. 2016. "Rethinking Assessment in a Digital Age: Opportunities, Challenges and Risks." *British Educational Research Journal* 42 (3): 454–476.

To, J., and D. Carless. 2016. "Making Productive Use of Exemplars: Peer Discussion and Teacher Guidance for Positive Transfer of Strategies." *Journal of Further and Higher Education* 40 (6): 746–764.

Tourangeau, R., M. P. Couper, and F. Conrad. 2004. "Spacing, Position, and Order: Interpretive Heuristics for Visual Features of Survey Questions." *Public Opinion Quarterly* 68 (3): 368–393.

Tsang, K. K. 2012. "The Use of Midpoint on Likert Scale: The Implications for Educational Research." *Hong Kong Teachers' Centre Journal* 11: 121–130.

Tsiligiris, V., and D. Bowyer. 2021. "Exploring the Impact of 4IR on Skills and Personal Qualities for Future Accountants: A Proposed Conceptual Framework for University Accounting Education." *Accounting Education* 30 (6): 621–649.

Tucker, B. 2012. "The Flipped Classroom." *Education Next* 12 (1): 82–83.

Tuckman, B.W. 1965. "Developmental Sequence in Small Groups." *Psychological Bulletin* 63 (6): 384–399.

Tullis, J. G., and R. L. Goldstone. 2020. "Why does Peer Instruction Benefit Student Learning?" *Cognitive Research: Principles and Implications* 5: 1–12.

University of York. 2019. Digital Creativity. Accessed 9 September 2022 <https://subjectguides.york.ac.uk/skills/digital-creativity>

Van Boxtel, C., J. Van der Linden, and G. Kanselaar. (2000). "Collaborative Learning Tasks and the Elaboration of Conceptual Knowledge." *Learning and Instruction* 10 (4): 311–330.

Van der Mescht, H. 2004. "Phenomenology in Education: A Case Study in Educational Leadership." *Indo-Pacific Journal of Phenomenology* 4 (1): 1–16.

Van der Vleuten, C. P. 2015. "Competency-Based Education is Beneficial for Professional Development." *Perspectives on Medical Education* 4 (6): 323–325.

Van der Vleuten, C. P., and L. W. Schuwirth. 2005. "Assessing Professional Competence: from Methods to Programmes." *Medical Education* 39 (3): 309–317.

Van Laar, E., A. J. Van Deursen, J. A. Van Dijk, and J. De Haan. 2017. "The Relation between 21st-Century Skills and Digital Skills: A Systematic Literature Review." *Computers in Human Behavior* 72: 577–588.

Venter, E. R., and C. De Villiers. 2013. "The Accounting Profession's Influence on Academe: South African Evidence." *Accounting, Auditing and Accountability Journal* 26 (8): 1246–1278

Verwey, S. 2022. "Fourth Industrial Revolution – Beyond Competencies." Accessed 7 February 2023. <https://www.uj.ac.za/news/fourth-industrial-revolution-beyond-competencies/>

Villarroel, V., S. Bloxham, D. Bruna, C. Bruna, and C. Herrera-Seda. 2018. "Authentic Assessment: Creating a Blueprint for Course Design." *Assessment & Evaluation in Higher Education* 43 (5): 840–854.

Villarroel, V., D. Boud, S. Bloxham, D. Bruna, and C. Bruna. 2020. "Using Principles of Authentic Assessment to Redesign Written Examinations and Tests." *Innovations in Education and Teaching International* 57 (1): 38–49.

Vos, L. 2015. "Simulation Games in Business and Marketing Education: How Educators Assess Student Learning from Simulations." *The International Journal of Management Education* 13 (1): 57–74.

Voshaar, J., M. Knipp, T. Loy, J. Zimmermann, and F. Johannsen. 2022. "The Impact of Using a Mobile App on Learning Success in Accounting Education." *Accounting Education* 1–26.

Vygotsky, L. S. 1978. *Mind in Society: The Development of Higher Psychological Processes*, edited by M. Cole, V. John-Steiner, V. Scribner, and S.E. Souberman. Cambridge, MA: Harvard University Press.

Walker, A. S. 2019. "Perusall: Harnessing AI Robo-Tools and Writing Analytics to Improve Student Learning and Increase Instructor Efficiency." *The Journal of Writing Analytics* 3: 227–263.

Watts, M. *The Science of Problem Solving: A Practical Guide for Science Teachers*. London: Cassell.

Wegerif, R., and N. Mercer. 1996. "Computers and Reasoning through Talk in the Classroom." *Language and Education* 10: 47–64.

Weinberger, A., and F. Fischer. 2006. "A Framework to Analyze Argumentative Knowledge Construction in Computer-Supported Collaborative Learning." *Computers & Education* 46 1: 71–95.

Wells, M. J. C. 2011. "Framework-Based Approach to Teaching Principle-Based Accounting Standards." *Accounting Education: An International Journal* 20 (4): 303–316.

Wever, D. B., H. V. Keer, T. Schellens, and M. Valcke. 2007. "Applying Multilevel Modeling to Content Analysis Data: Methodological Issues in the Study of Role Assignment in Synchronous Discussion Groups." *Learning and Instruction* 17 (4): 436–447.

Wiewiora, A., and A. Kowalkiewicz. 2019. "The Role of Authentic Assessment in Developing Authentic Leadership Identity and Competencies." *Assessment & Evaluation in Higher Education* 44 (3): 415–430.

Wilburn, N. L., and B. G. Kilpatrick. 2020. "A Mini-Course Approach to Incorporate IFRS into the Accounting Curriculum." *Journal of the Academy of Business Education* 21: 32–46.

Williams, J. B., and A. Wong. 2009. "The Efficacy of Final Examinations: A Comparative Study of Closed-Book, Invigilated Exams and Open-Book, Open-Web Exams." *British Journal of Educational Technology* 40: 227–236.

Wilson, L., S. Ho, and R. H. Brookes. 2018. "Student Perceptions of Teamwork within Assessment Tasks in Undergraduate Science Degrees." *Assessment & Evaluation in Higher Education* 43 (5): 786–799.

Wilson, R. M. 2011. "Alignment in Accounting Education and Training." *Accounting Education* 20 (1): 3–16.

Winterton, J., and J. J. Turner. 2019. "Preparing Graduates for Work Readiness: An Overview and Agenda." *Education + Training* 61 (5): 536–551.

Woodward, J., and E. Neunaber. 2020. "Perusall: Digital Active Annotation Tool in ESL Reading Classes." *A Journal of Pedagogical Practices across Maryland Community Colleges* 34 (1): 13–14.

World Economic Forum. 2018. "The Future of Jobs Report 2018". Accessed 9 September 2022. http://www3.weforum.org/docs/WEF_Future_of_Jobs_2018.pdf

Xie, K., and F. Ke. 2011. "The Role of Students' Motivation in Peer-Moderated Asynchronous Online Discussions." *British Journal of Educational Technology* 42 (6): 916–930.

Yang, S. J., J. Zhang, A. Y. Su, and J. J. Tsai. 2011. "A Collaborative Multimedia Annotation Tool for Enhancing Knowledge Sharing in CSCL." *Interactive Learning Environments* 19 (1): 45–62.

Yuan, C. H., and Y. J. Wu. 2020. "Mobile Instant Messaging or Face-to-Face? Group interactions in Cooperative Simulations." *Computers in Human Behavior* 113: 106508.

Zhao, N., F. Gao, and D. Yang. 2018. "Examining Student Learning and Perceptions in Social Annotation-Based Translation Activities." *Interactive Learning Environments* 26 (7): 958–969.

Zhu, X., B. Chen, R. M. Avadhanam, H. Shui, and R. A. Zhang. 2020. "Reading and Connecting: Using Social Annotation in Online Classes." *Information and Learning Sciences* 121 (5/6): 261–271.

Zyto, S., D. Karger, M. Ackerman, and S. Mahajan. 2012. "Successful Classroom Deployment of a Social Document Annotation System." In: *Proceedings of the SIG CHI Conference on Human Factors in Computing Systems* (pp. 1883–1892).