Charting a Clear Course Through the Methodological Jungle: Lessons About PAR from and for Simulation-Based Educational Research

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Abstract: Many argue that technology brought about by the Fourth Industrial Revolution offers new opportunities for student learning. In order for educators to use technology with wisdom, in-depth longitudinal research using rigorous methodological approaches is needed to understand the opportunities and challenges of including these technologies in management education. Therefore, educational researchers are challenged to design research projects to collect data from multiple sites over several years using various methodologies. This article examines strategies used by the researchers to design and implement a research project employing a Participatory Action Research (PAR) approach that combined qualitative and quantitative data from two universities across several years. The research project was specifically designed to study learning using a business simulation. The article describes the research project including the various data collection points and analysis methods. The purpose of this article is to bridge the theory-implementation gap enabling educational researchers to consider the design of a comprehensive research project as well as identifying key challenges and practical suggestions for using PAR.

Keywords: Participatory Action Research (PAR), business simulation, education, qualitative research, quantitative research, methodology

1. Introduction

The tension between what is and what could be presents a scenario that either overwhelms causing inertia or inspires action. The very idea of creative tension as the gap between an idealised vision and current reality is not new, but its many iterations in countless situations do spark interesting and often novel questions and approaches (Senge, 1990). One established set of concepts that are an expression of this tension is the gap between theory and practice, whether real or perceived the conversation and considerations brought to bear by this perceived gap demand attention from academia. In a microcosm of the larger question about the gap between theory and practice the authors zoom in on the gap between methodology as theory and the actual implementation of a research project as practice. Of course the implementation of the project is not so distant or far removed from the theory that describes it, as to call the gap a dichotomy but the difference is real enough when the theory is clear and crisp and the implementation can be complex and messy. This has been the experience of the researchers that dutifully embarked on an educational research project with the best intentions and a grasp of the theoretical concepts. This article elaborates on the challenges and benefits that cannot be fully grasped by reading about them in a book but that results from experiencing the reality, which of course comes not only with challenges but also benefits!

Embarking on a comprehensive longitudinal educational research project goes beyond dealing with the theory versus practice debate. The opportunities for dynamic tension between concepts demanding a resolution of some kind appeared abundant. In the search to answer questions about teaching and learning efficacy were the educators going to fully embrace the view proposed by Drucker that, "you can't manage what you can't measure" (Merinen, 2013)? It is a well enough accepted axiom in management, but if a methodological lens is applied to this statement then surely only quantitative measures would suffice? What about the sentiments of the sociologist, Bruce Cameron that "not everything that counts can be counted, and not everything that can be counted counts" (Cullis, 2017)? Embracing this view necessitates a more nuanced approach, surely there are some salient behavioural or attitudinal aspects that cannot be reduced to numbers but that have an important bearing on lecturer efficacy and student learning? It is a desire to grapple with this dynamic tension to consider both lived experiences and data driven outcomes that specifically contributed to the decision to pursue complementary mixed methods, nested in a Participatory Action Research project. The theoretical considerations and practical realities that emerged during the project will be discussed in this article.

2. Background

Computer based simulations and their incorporation into the classroom have grown in popularity. There are various computer based simulations available but simulations that cater for management education share certain commonalities. The simulation creates a virtual marketplace where students compete against peers or virtual companies sometimes on their own but most often in teams. This competition creates an interactive and immersive learning experience as students have to make decisions to manage their virtual companies. The simulated environment offers the opportunity to compress "years" of business performance into rounds where algorithms calculate the quality of decisions relative to market demands and competitor actions. This feature enables students to make "annual" decisions in areas such as marketing, production, research and development and finance, these annual decisions are processed as a round and students receive their feedback in the form of financial statements (Capsim, 2019). Students are responsible for their respective companies for several rounds, creating a unique opportunity to reflect on their actions and outcomes, learn deep lessons and make adjustments based on feedback loops. Simulation based learning offers a unique opportunity to grasp the cause and effect of their decisions and to develop a deep understanding of the drivers of profitability. It must also be mentioned that these virtual companies allow students to explore and deal with the outcomes of their actions, poor results must be addressed and corrected in subsequent decision making. In this way the simulation itself is iterative in the same way a longitudinal PAR project is.

The research agenda to explore this pedagogy has taken shape seeking to address and uncover the key elements that contribute to effectiveness (Adobor & Daneshfor, 2006). The mere mention of measuring 'effectiveness' raises a whole gamut of important considerations, what does effectiveness mean, what should be measured and how? McKenney and Reeves (2018) summarise the decades long evolution of the effectiveness conundrum by explaining that educational researchers have either emphasised rigour or impact, but that ideally synergy should be sought between these concepts. This insight is both useful and daunting to educational researchers, Anderson and Lawton (2009) put the challenge into perspective by noting how unlikely it is that one article will conclusively speak to the efficacy of a given pedagogical approach. Rather, to achieve clarity and insight, research itself must be regarded as an iterative process requiring countless small but purposeful steps in the right direction. Interestingly, determining the 'right direction' for research and ensuring sufficient interest by scholars in that direction is easier said than done. Arbaugh and Hwang (2015) point out that while trends continue to abound and garner interest, more established areas, such as experiential learning have not benefitted fully from renewed interest and that multi and transdisciplinary research is suffering due to a lack of cross disciplinary research dialogue. Interestingly, the business disciplines benefiting the most from the surge in articles and citations is rather uneven with a focus on entrepreneurship education, online education or critique of business schools (Arbaugh & Hwang, 2015). It is precisely out of the critique that business schools receive, that a cry for the reinvention of management education emerges (Steyaert, Beyes & Parker, 2016).

The right method to use in a research project should always be dictated by the research question. Borrowing from the field of architecture where form follows function, it can be said that in research, 'methodology follows question'. In pursuit of the 'right direction' and reimagining management education, the researchers started with multiple questions, what is the ideal group size, should lecturers allocate roles to students, are students deeply engaging in the strategic planning process when they make decisions in the simulation, are they developing leadership skills in their group interactions? These questions were not all entirely synergistic but research questions could be grouped according to thematic categories such as 'team work', 'leadership development', 'ethical decision making' and 'strategic planning and decision making', to name a few. In addressing the variety of research questions that emerged the researchers agreed that the overarching primary objective of the research was to measurably increase the impact of simulation based modules, both in terms of teaching strategies employed and in terms of learning outcomes achieved by students, without burdening students with additional work. The variety of questions that were posed also necessitated the collection of different data points, and therefor different data analysis methods were employed, each time ensuring that the right lens was utilised for the right question and that appropriate rigour was applied to the research process and management of data.

3. Review of the literature

3.1 Participatory Action Research as a method

Action Research involves systematically collecting and analysing data with the overarching goal of effecting change by taking action (Gillis & Jackson, 2002). Newton and Burgess (2016) allude to the fact that there are many opposing views of the different types of Action Research. For the purposes of this paper Action Research is categorised into four types or modes (see Table 1).

Table 1: Four types of Action Research

Type	Author	Description
Technical Action Research	Denscombe, 2003	Aiming to improve effectiveness of practice Practitioners co-opted and greatly dependent on researcher as facilitator
Practical Action Research	Creswell, 2005 Denscombe, 2003	Studying local practices Involving individual or team-based inquiry Focusing on self-development Implementing a plan of action Leading to practitioner as researcher In addition to effectiveness, aims at practitioner's understanding and professional development Researcher role: to encourage practical deliberation and self-reflection of practitioners
Participatory Action Research	Chambers, 2004 Creswell, 2005 Wadworth, 2005	Studying social issues that constrain individual lives Emphasising 'equal' collaboration – research participants involved as integral part of design Focusing on life-enhancing changes resulting in the emancipated researcher
Emancipatory Action Research	Denscombe, 2003	In addition to effectiveness, understanding and improvement, it aims at transformation and change within the existing boundaries and conditions Focus on changing the system itself

Source: Adapted from Maree (2007)

The research objectives of the particular study in question aligns with Participatory Action Research. As a subset of Action Research, PAR, in essence, aims to effect social change by means of specific actions (McNiff & Whitehead, 2006). Participatory Action Research (PAR) offers an opportunity to build a relationship between theory and practice (Kemmis & McTaggart, 2005). An important criterion for successful PAR is both the Action Researcher and community members who want to see an improvement in their situation. PAR is an iterative process of action and reflection cycles which includes those being researched in a dialogue, creating knowledge to enable action. This methodology is well suited to research in education, adult education, community development and organisational development (Young, 2006). PAR is a particularly useful method for educators as it enables the researcher to implement lessons learnt throughout the research process in order to benefit and encourage better learning in a series of iterative feedback loops. PAR allows the qualitative features of participants' views, patterns and even feelings to be revealed without the researcher manipulating or controlling (Leininger, 1985; MacDonald, 2012). Importantly, knowledge creation is regarded as an active process (McNiff & Whitehead, 2006). Thus far, action research has assumed a reality which can be uncovered and then altered in some way or improved upon for emancipatory purposes. This however begs key questions about where our ideas of what counts as 'improvement' come from. How can the researcher both 'observe' reality as well as being part of it and thus be implicated in its continual creation and recreation? These issues are much more complex than action research has acknowledged so far. Ideally researchers need to move beyond the notion of the 'reflective practitioner' to encompass post-structuralism which attends more to the way in which we construct reality (Brown & Jones, 2001).

The work of Kurt Lewin (1944) is widely acknowledged as the origin of PAR as he is considered the father of Action Research (Gillis & Jackson, 2002). At its core PAR is founded on Lewin's life experiences and the philosophy that people would be more motivated to accomplish their work if they felt involved and valued in decision making processes (McNiff & Whitehead, 2006). Another key contribution by Lewin in the process of popularising Action Research was the presentation of this methodology as an approach to not only study a social system but also work to simultaneously effect changes (Gillis & Jackson, 2002). Lewin's original advice to researchers about how to structure and report on their research is a cycle that is still in use today, moving

from observing, to reflecting, acting and evaluation to modifying (McNiff & Whitehead, 2006). Schön (1995) posits that new paradigms of scholarship, which works to include research, teaching, application and integration should be firmly based on reflection. With this original focus on reflection well and truly intact it should not be a surprise that the roots of PAR also wind their way to Paulo Freire, who was a believer in the value of critical reflection (as part of a wider process) for personal and social change (Maguire, 1987). Freire also espoused the empowerment possibilities of PAR by emphasizing the importance of critical consciousness on social change (Freire, 1970).

Promisingly, PAR provides an alternative to traditional social research by changing the narrative from the linear 'cause and effect' to a framework involving participation and considering the context of participants' lives (Kelly, 2005; Young, 2006). One of the criticisms from a more traditional perspective is that PAR is a 'soft' and open-ended research design (Young, 2006). The open ended nature of this approach can, however, be tremendously beneficial for complex contextual problems. In light of this, PAR as a method acknowledges the need for participants to become co-creators, forming part of the research process, from design to dissemination (Vollman, Anderson & McFarlane, 2004). The purpose of the research agenda then is to enable capacity development, empowerment, social justice and of course, participation instead of passivity (Vollman *et al.*, 2004).

PAR entails a cyclical process that iterates between research and fact finding, taking action and reflecting on the process and distilling insights before further research takes place (Marshall & Rossman, 2006). It also requires individuals to be self-reflective with the ultimate goal of improving the situation (Koch, Selim & Kralik, 2006). Interestingly, Selenger (1997) highlighted that an important component of PAR is that it has the ability to make participants aware of the resources under their control that they can utilise for self-reliant development. Therefore, PAR is very well aligned with the goal of educators to encourage self-directed learning in their students. The stages of the PAR project that the researchers progressed through as well as the measurements utilised are depicted in Table 2.

Table 2: Stages of the PAR process in the simulation-based learning research project

Questions to be addressed	Previous studies	Variable elements to be measured	Local measurements	Form of analysis
How to increase the impact of a business simulation course?	Abdullah et al. (2013) Tiwari et al. (2014) Vos (2015) Lu et al. (2014) Kohler et al. (2015) Avramenko (2012)	▪ team work ▪ leadership development ▪ ethical decision making ▪ strategic planning and decision making ▪ strategic thinking ▪ business management skills	Participant observation Validated measurement instruments conducted via surveys Student and lecturer reflections Student performance Focus groups	Thematic analysis Statistical analysis

Source: Adapted from James (2008)

3.2 The value of employing a Methodological mix in the context of PAR

Scoles et al. (2014) agree that mixed methods are particularly appropriate to address problems in complex environments, such as presented in the field of education. Ideally, mixed methods are valuable when quantitative and qualitative data can be analysed together and the insights from one method can complement the use of the other method (Scoles et al., 2014). Usefully, PAR is very flexible when it comes to methods that can be employed to collect data. The reason for this flexibility is that in each context the researcher and participants collaboratively define the research problem and then consequently select the appropriate methods to collect the required data (McNiff & Whitehead, 2006). According to Creswell (2009) a mixed methods research project must be carefully designed taking cognisance of four key aspects, being i) Timing –

consider whether qualitative and quantitative data should be collected sequentially or concurrently; ii) Weighting – the research question should dictate the appropriate weighting or priority assigned to qualitative or quantitative research in a particular study. Weighting should differ for each specific study; in some cases it is most appropriate that the weightings are equal, in others there should be a greater emphasis on either qualitative or quantitative; iii) Mixing – qualitative and quantitative data may be mixed at various stages of the research project for example collection of data, analysis of data and/or data interpretation, and in some instances during all three stages; finally iv) Theorising – considering what theoretical frameworks might need to guide the design of the research project. The use of both qualitative and quantitative methods provide a specific opportunity to measure performance, consider behaviours and triangulate research findings. Some of the methodologies utilised in this research project are:

- *Participant observation* which involves the systematic noting and recording of behaviours, events and objects which the researcher obtains by having access to research subjects in the context of a social setting, providing a rich source of data (Marshall & Rossman, 2006). Students and lecturers (the researchers) have many interactions ranging from lectures to consultations and even e-mailed queries that provide rich and diverse opportunities for observation.
- *Student and lecturer reflections.* Students are given the opportunity to reflect on a weekly basis with probing questions that have been developed to encourage the appropriate depth of reflection by students who very often have not been required to reflect before and may not be familiar with how to reflect on their experiences, actions and insights. The researchers keep a record of their reflections as lecturers in an electronic reflection diary which is normally updated after lectures and after interactions or events that spark insights.
- *Validated measurement instruments* conducted via surveys. Surveys are made available to students every so often using the weekly hyperlinks for reflections.
- *Student performance during the simulation,* marks, and assurance of learning reports provide a quantitative view. The simulation records student engagement in the form of logins, decisions made, results for each round and peer evaluation results. These quantitative measures provide a wealth of data that can be analysed to triangulate findings.
- *Focus groups,* are a type of small group interview benefiting from the interactions between research participants, who have characteristics relevant to the study in common, as a source of data (Marshall & Rossman, 2006). Focus groups are habitually conducted at the end of the semester to consolidate student learning, as a form of revision for the summative assessment and to distil insights for future improvements to the class.

3.3 The value of a systems thinking perspective

The discussion at the beginning of the article was launched by probing the value of creative tension gaps in inspiring action (Senge, 1990). This links strongly to the systems thinking approach (Senge, 1990) which advocates for a holistic view of the system in question with the goal of creating learning organisations. Part of this holistic perspective involves identifying connections between sub-parts of the system that are not obvious and understanding why they are behaving the way they are (Arnold & Wade, 2017). According to Arnold and Wade (2015) systems thinking can be defined as a "system of synergistic analytic skills used to improve the capability of identifying and understanding systems, predicting their behaviours, and devising modifications to them in order to produce desired effects".

Educational research projects are clearly situated in a larger system where institutional realities and individual student proclivities all affect and are in turn affected by the system they are a part of. Kastens and Manduca (2017) agree that a systems thinking perspective can be valuable in planning and executing educational reform projects. The group learning that is advocated for in organisations that seek to employ systems thinking (Senge, 1990) dovetails well with PAR as a methodological approach and specifically in this case where different methodological tools are used to collect data about the learning process in question. Interestingly there are two clear interfaces between a systems thinking approach and this research project, firstly the iterative nature of PAR itself as a methodology and secondly the iterative nature of the simulation utilised as a teaching tool. The iterative nature of both the simulation and the PAR project create multiple feedback loops that both the students and researchers can benefit from in their development as increasingly reflective practitioners.

The systems thinking approach is valuable precisely because it recognises that educational improvements are rarely as simple as changing a single action and measuring a single effect, it more likely means that multiple contributory causes are likely to be involved in achieving a single desirable outcome (Kastens & Manduca, 2017). This resonates with the researchers as multiple interventions may converge to improve, for example, the teamwork skills of students. Feedback loops play an important role in systems thinking in terms of garnering growth and ensuring large impacts from limited resources (Arnold & Wade, 2017; Karstens & Manduca, 2017). For example a negative feedback loop governs departures from goals and serves to balance efforts before the escalation becomes overly negative. In the simulation for example if a team over produces without regard for their customers preferences their finances will suffer, often in the form of an emergency loan that serves to reel in their decision making in subsequent decision rounds as they solicit guidance and work to become profitable again. Positive feedback loops encourage participants towards alignment with project goals that are deemed to be effective. For example the researchers noted that pointed reflection questions were answered more holistically and provided more opportunities for the kind of reflection that was envisaged so all reflection questions were revamped to take advantage of this insight. The discussion on feedback loops highlights succinctly the two facets or skill areas in systems thinking that must be mastered, namely, gaining insight which involves improving systemic insight of a particular system and secondly, using insight which involves application of the systemic insight gained (Arnold & Wade, 2017). It is no wonder that the systems thinking approach offers the potential for an ambitious educational interventional to amount to more than the sum of its parts (Kastens & Manduca, 2017).

4. Charting a clear course in the Simulation research project

4.1 Sample

Data has been collected from modules at two South African universities from 2015 – 2018 and should continue until 2020. Both modules centre on a computer based business simulation and have similar learning outcomes.

At University 1 the module is part of a Strategic Management Honours degree, at University 2 it serves as a capstone module for a Bachelor of Business Science degree. The data collection instruments and questions were identical across both university modules for the purpose of comparability. The total sample consisted of 438 participants during the period 2015-2018 (see Table 3).

Table 3: Sample size per year

Year	University 1	University 2	Total
2015	44	26	70
2016	68	17	85
2017	60	29	89
2018	47	147	194
Sub-total	**219**	**219**	**438**

Source: Authors own

4.2 Methods of data collection and instruments used

The project uses a systematic Participatory Action Research approach as the researchers and students are participating in the research project collectively engaging in finding solutions to increase student learning. The researchers are also responsible for lecturing the modules and Figure 1 provides an overview of the research process. This means that the researchers are also moving through the participating, acting and research phases with the participants. Students are seen as part of the research team as their actions and reflections enable a collaborative process.

A key research tool used in the project is reflection. Both the researchers' reflection, as well as students' reflection, are used as data collection methods as can be seen in Figure 1. The researchers write a reflective journal and make notes of their experiences and observations during the course of the semester. Students are expected to reflect every week as part of the experiential learning cycle (Kolb, 1993, 2007). In this way, the reflection assists student learning but also serves as a data collection method, complying with one of the project goals, namely not to overwhelm or burden students with extra work. Reflection is prompted by carefully selected prompting questions based on the learning experiences within the curriculum in the specific week. A combination of open-ended questions (for example: *What do you hope to learn from participating in*

the simulation?) and short answer questions (for example: *Which option best describes your team's success at forecasting, in terms of the gap between your decisions, forecast results and actual results*) are utilised.
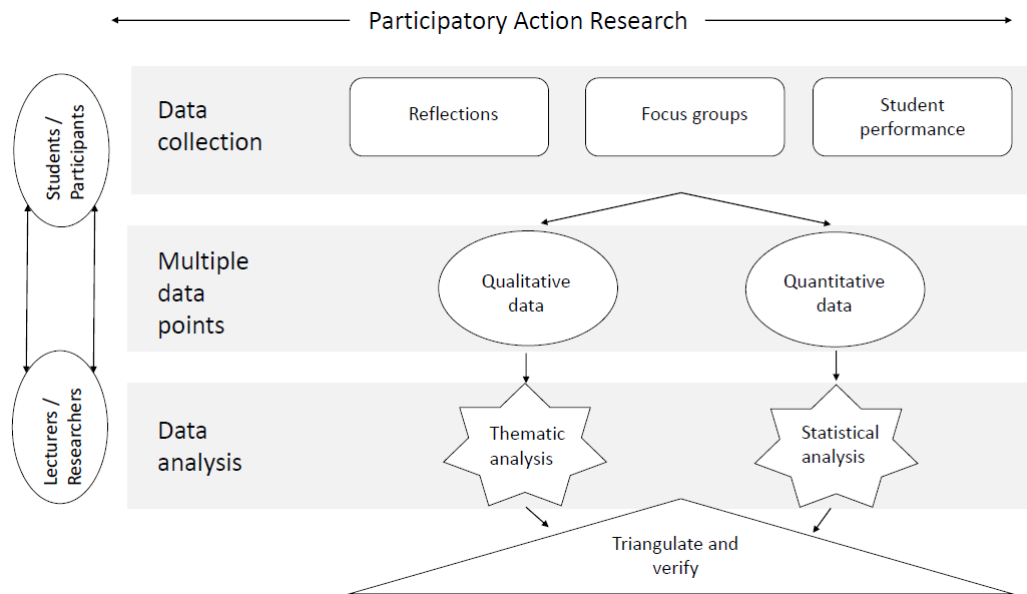

Figure 1: Conceptual model of the methodological mix utilised in the simulation research project

Source: Authors own

Validated measurement instruments are also included to measure constructs such as group efficacy and group conflict resolution using likert scales. While the measurement scales were not developed in South Africa, the researchers reviewed the language of each item within the scale to account for any contextual differences. Google forms are used so that students can submit their reflections online at their convenience during the week. As lessons are learnt during the PAR process, the researchers have adapted some questions and added others where appropriate.

Peer evaluations of team members are done twice during the semester. This data is collected via the simulation platform and provides quantitative data. Focus groups are also used at the end of the semester. Students are prompted to discuss issues such as the most important lessons learnt, what they would change about the module in the future, etc. The focus groups are recorded and transcribed in order to be analysed.

Student performance during the semester is another important source of data which is used to develop a holistic view of student learning. Student performance data is collected using their simulation results, marks and assurance of learning reports. Performance during the simulation is measured using a balanced scorecard (Kaplan & Norton, 1996) containing the four standard categories namely 'financial', 'internal business processes', 'learning and growth', and finally 'customer'. The assignments completed for which marks were captured include reflections and peer evaluation, simulation marks as per the balanced scorecard, business report, end of semester presentation and exam marks. The assurance of learning report includes marks for analytical skills, critical thinking skills and functional knowledge skills, providing additional quantitative data. Demographic information, such as gender, age and university, of the participants are collected using Google Forms.

4.3 Analysis of data

Thematic analysis is used to extract themes from the qualitative data as indicated in Figure 1. The researchers used the six steps described by Nowell et al. (2017) during thematic analysis. (1) The researchers familiarised themselves with the data – this involved immersion in the data, the qualitative data was read and re-read several times on Nvivo to search for meanings and patterns. (2) Generation of Codes – the researchers identified initial codes in order to simplify the core characteristics of the data. (3) The researchers searched for themes – in this phase the initial codes were collated into thematic categories. (4) Thereafter, the themes identified in the previous phase were reviewed to ensure relevance to the topic under investigation, being

increasing the impact of simulation-based modules. (5) Themes were defined and named through detailed analysis of each theme that was identified. (6) A thematic analysis report was written as part of the final analysis to ensure logical interpretation of the data. The quantitative data is analysed using SPSS in order to arrange and summarise the data based on descriptive measures (Selvanathan, Selvanathan & Keller, 2011).

A key characteristic of the methodological approach used in this research project, which is also an inherent trait of PAR, is its iterative nature. Any insights gleaned by the researchers are undergoing a two tier process of member checking with students to ensure clarity and accuracy in the discussion and insight and then also peer debriefing between the researchers. Peer debriefing involves collaboration between researchers in pursuit of ensuring that valid information is collected. While it is ideal in debriefing for the said colleague to be impartial and have some distance from the study, the researchers find that working for different institutions and with different cohorts of students provides perspective. Once insight has been clarified and distilled not only does it permit for the triangulation and confirmation of findings but it also feeds back into the data collection process as questions and processes are updated and tweaked.

4.4 Findings and changes to the project to date

The modules are continuously improved as the researchers and students reflect and learn during and from the research process which means that some findings result from the iterative nature of the project and educator reflections, and not only from the more formal thematic or quantitative analysis approaches. For example, initially the module design included two practice rounds spanning two weeks. After the first PAR cycle, students reflected that they would benefit from playing four rounds in the two preparatory weeks in order to 'see how their strategies play out', this was then implemented from 2016. Another example of how the student participants influenced the module was uncovered during the focus groups where students raised a concern regarding the workload of the weekly reflections. The educators decided that the value of the reflective pieces towards their final mark should be increased in order to more accurately align their effort and time with the assessment weighting. Revision sessions were also adapted on the advice of the student participants to include practice financial questions. Students' reflections at the end of the semester on what they would do differently if they could turn back time and start the semester over pointed towards the importance of reading the simulation guide early in the semester. Although the modules at that time already did specify that the students should read the guide in the first week, the educators decided to add an in class quiz using technologies like Socrative and Kahoot to test their understanding of the guide in the second week. The main idea was that the exercise could expose and highlight the importance of reading the guide earlier in the semester.

Continuous improvement is important as the central goal of any educational research should be to improve learning. The lessons learnt by the researchers lead to actions that benefit both current and future students. The educators are learning important lessons regarding the module design as well as for the research project.

In terms of the module design, changes made include adding class activities to address a need identified within the research process. For example, a strategic decision making technique was included to assist the students to assess their proposed decisions using various lenses to consider the issues at hand. A simulated team survival activity was introduced to show the importance of team work. Students are challenged to rethink the value of historical empirical evidence with an activity based on Hume's theory of causation. This activity was specifically introduced as the educators' reflections showed that students tend to believe that historical financial data produced by the simulation is an absolute predictor of the future rounds, resulting in them being blindsided by unanticipated actions by competitors for example. Other improvements made to the module design was the inclusion and refocusing on theory in the classroom sessions. This was as a result of the educators' reflection on the type of questions asked by the students during the semester. Theory on ethics, strategy, financial statements and ratios as well as the practice of reflection was included.

In terms of changes made as a result of the research project, a good example is that initially the researchers asked more open ended reflection questions, such as "What was the most important thing you learnt this week?" or "How have you experienced the simulation?". However, the researchers noticed that the student participants gave vague answers that did not indicate the required depth of reflection. Therefore, the researchers redesigned the reflection questions in order to prompt more depth of reflection focused on key experiences within the semester. Some example questions include:" What did you learn about ethical decision making that could be useful to you in future?" Another important lesson regarding data management was that

in the first year of the project the researchers used their institutions Learning Management Systems to capture the students' reflections. However, later it became apparent that the data would be lost as the educators lose access to the module page after a year and even if data was downloaded it was not in an 'analysis friendly' format. The search for alternative solutions led the researchers to use Google Forms to collect the reflections and merely post the links on the respective Learning Management Systems (LMS).

4.5 Data management choices

Good data management ensures that each researcher knows what to do, why it is being done, when and how the data should be stored so that the data can be consistent throughout the research project which in turn ensures high quality data that increases the odds of trustworthy and useful findings (Taylor, 2017). The number of participants increase each year and so the demands of ensuring rigour and consistency grows with each subsequent semester, consequently the researchers found themselves relying more and more on technology as a tool to manage data. Google forms were used to capture student reflections and responses to validated measurement instruments. Google drive was used as cloud based storage to centralise and organise the records pertaining to informed consent, student performance, voice recordings of focus groups and storage of transcripts. A lesson learnt was that LMS's only store data for the duration of a semester and if not saved timeously, data can be lost. The challenge with downloading data from LMS's at two different institutions also meant that formatting and creating synchronicity became both a timeous and tedious exercise. Using Google forms ensures uniformity between campuses and across years.

Deciding how to organise the captured data also presented interesting challenges, particularly for qualitative components of the project where the boundaries between research themes are not so clear cut. Word documents were created for analysis in Nvivo and organised according to questions asked and answered, campus and year of the responding cohort, with care to ensure that relevant answers (even to seemingly unrelated reflection questions) were included in the appropriate thematic grouping at face value.

5.   Ethical considerations

Flick (2018) reminds researchers that careful consideration should be taken at every point during the research process, as each step highlights different nuanced ethical dimensions. Careful consideration should be taken regarding the scientific quality of the study and the welfare of the participants while at all times respecting the dignity and rights of any and all participants (Flick, 2018). The researchers went to great lengths to assure the scientific quality of the research project by studying the existing literature in order to ensure that the questions posed weren't a mere duplication of previous studies. This included doing an extensive systematic review of teaching approaches associated with simulation-based modules in the most prominent business databases. The Human Research Ethics Committees of both institutions involved in the project reviewed any potential ethical risks and approved that the project adhered to high ethical standards before the study commenced. This process included a full review of the purpose of the project, the research questions and aims, identification of the sample, the data collection, analysis and finally reporting of the findings. The researchers ensure that participants are adequately informed in order to give consent by firstly doing a presentation on participatory Action Research, what the research project involves, the time commitment and any potential inconvenience for participants as well as their right to withdraw from the research at any time.

Secondly, each participant receives an explanatory letter elaborating on the presentation that has been developed for this purpose:

- The scope of the research, and how the sample was selected
- What informed consent means and how to withdraw from the research
- Any potential benefit, risks and inconvenience to the participants
- Confidentiality and storage of data
- Contact information of researchers
- How the participants may request a report of the research results

Ethical principles that relate specifically to PAR that were adhered to include that the all participants must be afforded the opportunity to influence the study, those who choose not to participate must be respected and finally, it is the researchers' responsibility to maintain confidentially throughout the research process (O' Brien, 2001).

6.   Validity, reliability and trustworthiness

Rigorous criteria and methodological standards are key to ensure the needed validity and reliability of any research project (Lub, 2015). Achieving rigour, minimising bias and ensuring the credibility of findings is the goal of the research project in question (Noble & Smith, 2015). While different terminology is used to describe the ideas of validity and reliability in qualitative research the objective remains similar. In pursuit of trustworthiness in qualitative research, credibility, transferability, confirmability and dependability are the criteria that have to be applied (Anney, 2014). Strategies that were utilised during the research project were informed by Noble and Smith (2015):

1. Acknowledge and work to minimise personal biases which could influence findings
2. Ongoing critical reflection of methods employed to ensure appropriate depth and relevance of data collection and analysis
3. Meticulous record keeping, ensuring interpretations of data are consistent and transparent
4. Seeking out both similarities and differences across responses to ensure different perspectives are represented
5. Inclusion of rich and thick verbatim descriptions by participants to support findings
6. Systematic and clear thought processes during data analysis and interpretations
7. Engaging with other researchers to reduce bias
8. Respondent validation- which aligns well with the principles of PAR
9. Data triangulation-different methods and perspectives work to ensure comprehensive findings

The considerations of validity, reliability and trustworthiness were incorporated during research design and carried through during implementation. The research project can be conceptualised as a wheel, see Figure 2. The outside rim of the wheel is PAR which is supported in turn by each of the spokes.
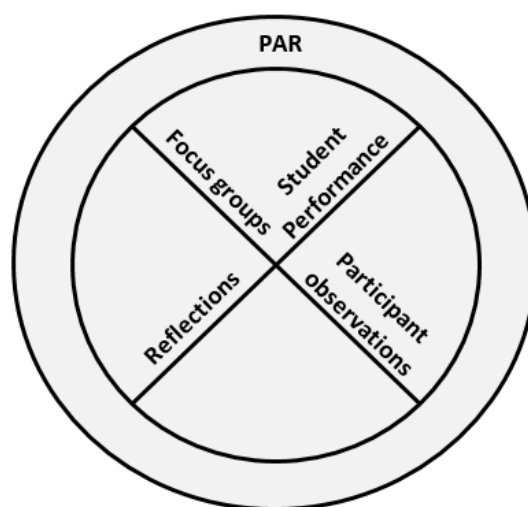

Figure 2: The PAR Wheel

Source: Author's own construction

None of the spokes are more or less important than any other, however if any of the spokes "fail" a quality test it jeopardises the quality of PAR, if not the given article or spoke in particular. Therefore, the quality of the project is mutually an interdependently reliant on the quality of each other spoke. In a similar way the comprehensiveness of the project is dependent on the presence of "enough" spokes to support the rim, this can be interpreted as saturation via findings or of methods. While we will not contend that there is a predetermined number of spokes that is ideal here we do advocate for the triangulation of findings using at least two data collection methods and ideally a mixed methods approach. The opportunity here is in the potential robustness of results, while strong advocates of either qualitative or quantitative approaches to answering research questions may not be easily coaxed out of their respective corners the authors contend that educational research could only benefit from approaches that incorporate mixed methods and by

implication, multiple perspectives. This again comes from the founding reason for the research project which was a call for more empirical data to support claims of teaching efficacy.

7. Implications for practice

The researchers have learnt a great many lessons throughout the research project, from an operational point of view a valuable lesson was to manage, store and file the data clearly and consistently! Akin to undertaking a building project, each phase has brought its own insights and challenges.

7.1 Challenges

7.1.1 *Administrative load of the research project*

A research project of this nature presents a challenge in terms of the administrative workload. The researchers noticed that a lot of valuable time is spent just managing the project. Administrative actions such as checking that the Google Forms links work every semester and relinking each questionnaire on the Learning Management System takes time. Another example is that for each cohort the researchers must collect and capture consent forms as part of the ethical clearance process, then at the end of the semester the data of students that did not give consent must be removed from the data set. The capturing and reconciling of the data across multiple weeks and campuses can get so time consuming that this presents a daunting challenge that may cause researchers not to get to the analysis phase. A potential solution might be to look for funding to assist with the administrative functions inherent in such a project.

7.1.2 *Keeping the data clean*

As the research project collects data from two universities' cohorts at the same time, it is often a challenge to ensure that the data remains clean. Each questionnaire begins with a question asking the student to identify at which campus they are studying, an incorrect selection here complicates accurate data capturing. This means that a great deal of time is taken to clean the data after each collection cycle and to consolidate all the data points. This challenge relates to the administrative load described above.

7.1.3 *Quantity of qualitative data*

The vast amount of qualitative data collected in the described PAR research project presents both an opportunity and a challenge. Collecting a high volume of qualitative data often assists the researchers to reach saturation when doing qualitative data analysis and ensures the trustworthiness of the research findings. However, this also complicates data analysis making thematic analysis a cumbersome process which can become overwhelming.

7.1.4 *Requires close collaboration between researchers*

The involvement of multiple researchers means that they have to work in close collaboration with one another as it is very important that the students experience similar learning stimuli to ensure quality data. Open communication and sharing of ideas and lessons is key to the success of this research project which requires high levels of trust. As deep reflection is the engine of the PAR process, the researchers must make time for reflection and discussion throughout the project.

7.1.5 *Messy non-linear cycles of PAR*

While theoretical descriptions of PAR describe the cyclical nature of the methodology as a linear process, in practise the researchers experience a much more complex and tangled affair. At times the researchers would move back and forth from diagnosis to action until a suitable solution was found that delivered the desired results. This was particularly noticeable in the early stages of the research project, and admittedly became less as the project matured. The challenge described here is in line with other practitioners' experiences (c.f. James et al. 2008).

7.2 Benefits

7.2.1 *Transforming teaching practices*

A well-established benefit of using PAR within an educational setting is that the educator can implement lessons learnt to the benefit of students as soon as a new understanding is uncovered. As this research project is spread over five years, this is a particularly important benefit for the researchers meaning that the entire project does not need to be complete for the students to benefit from it. For example after the researchers

wrote their first journal article a decision making technique was added to equip students with the tools to look at problems and associated decisions through different lenses.

7.2.2 Creating a research pipeline

Designing and implementing a research project of this scale with one overarching research question and multiple secondary questions, allows the researchers to zoom into specific secondary questions in turn and provides many research avenues. Of course, not all of the avenues are equally useful or fruitful to contribute to the body of knowledge, but it puts the researcher at an advantage as they can conceptualise several articles and write as time and resources allow.

7.2.3 Discovering helpful technologies

As this article described, the research project entailed collecting several data points at different intervals. At times this presented data collection and storage challenges, especially initially. The researchers met this challenge through using and experimenting with different technologies, such as Google Forms, Today's Meet, Nvivo and Kahoot. Therefore, an added benefit of a research project of this size using PAR is discovering and learning to use new and innovative solutions, often employing technology.

8. Conclusion

Often a gulf exists between the theoretical understanding of methodology and the practical implementation of a sound research project. This article reflected on a research project showing the interplay between theory and practice by disclosing in detail how the research project was conceptualised and implemented by highlighting some of the practical reasons for decisions that were made. The nature of Participatory Action Research, combining qualitative and quantitative data, the systems thinking approach, ethical considerations, reliability and validity considerations are some of the theoretical roots that were discussed. From a practical point of view, the article explained how the stages of PAR were implemented and the conceptual model of the research project was shared. The article also highlights how insights and lessons learned from the PAR process so far have informed changes to the two modules that are under investigation, revealing that valuable insights are not only limited to the end of the project but that improvements to teaching and learning can be made throughout. The practicalities of ensuring reliability, validity and trustworthiness were discussed and, finally the researchers reflected on the main challenges and benefits of engaging in a research project of this nature.

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