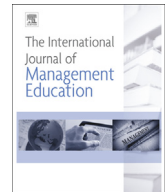




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# Simulation games in business and marketing education: How educators assess student learning from simulations



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## ABSTRACT

Considerable research findings have demonstrated the value of simulations in motivating and engaging students and in developing their skills and competencies. Almost no research, however, has investigated how educators assess student learning from simulations. Drawing upon the literature into authentic assessment – a body of work that provides evidence-based principles to enhance assessment practice and outcomes – this paper attempts to provide a foundation for research in this area. From the 35 surveys and 8 interviews conducted with educators who use business-related simulations, it is apparent that the majority are applying creative assessment practices and that most follow authentic assessment principles – whether they use this terminology or not – including offering students developmental (formative) assessment opportunities over the course of the simulation, explaining assessment criteria and ways that students can improve their performance, requiring students to undertake reflection on their learning and outcomes, and ensuring that higher order thinking skills are engaged. Findings also show considerable similarities in where students are performing less well and in tutor perceptions of the reasons why. The research provides ideas for simulation educators to develop their assessment as well as a basis for future research into simulation assessment and ways to improve student outcomes.

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## 1. Introduction

Over the past 35 years, a good deal of research has been undertaken into the validity of simulation games as tools to deliver learning outcomes (Anderson & Lawton, 2009; Faria, 2001; Faria, Hutchinson, Wellington, & Gold, 2009; Hofstede, de Caluwe, & Peters, 2010; Hsu, 1989; Parasuraman, 1981). Within this research stream, the term ‘assessment’ often refers to assessing the validity of simulations as teaching and learning tools.

The issue of how student learning from simulations is assessed has received very little attention, however. This is interesting given that a well formulated assessment strategy is an important means of determining whether the learning approach is valid – results on the assessment show that students have achieved what they were meant to achieve in terms of knowledge, skill development and other learning outcomes.

Assessment is a major research area within higher education and most recently the focus of this research has been the role of assessment in developing the learner rather than on simply judging student knowledge at a particular point, usually

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through an exam (Sambell, McDowell, & Montgomery, 2013). Work by researchers such as Cohen (1987), Steffe and Gale (1995), and Biggs (1996) have demonstrated that when assessment is aligned to both the teaching activities and to the learning outcomes that the tutor seeks (e.g. demonstrating higher level thinking skills), students tend to engage more, at a deeper level, and perform better. This work on constructive alignment, as Biggs' (1996) termed it, has underpinned another stream of assessment research that seeks to conceptualise and develop frameworks of practice that tutors can follow to engage and motivate students, while also enhancing performance and outcomes. One such conceptualisation is that of *authentic assessment*, the main tenets of which are based on a constructive alignment of teaching, learning and assessment where the activities involve developing skills and competencies students will need in the work environment, offering them a number of practice opportunities prior to the graded assessment all with a great deal of tutor feedback along the way (Ashford-Rowe, Herrington, & Brown, 2014; Schell, 2000; Wiggins, 1993).

Simulation games tend to have many features of authentic assessment. Their generic name alone indicates the importance that game designers place on replicating a real world decision making situation set within a dynamic operating environment that requires progressively higher levels of decision making competency in order for students to improve performance (Feinstein & Cannon, 2002; Jacobs & Dempsey, 1993). Better performance on business-related simulations comes from students' learning how to interpret and make more effective use of information on markets, competitors, financial data, and customers; understanding and using tutor feedback; bringing in and integrating theories and concepts from prior studies; thinking critically about past decisions; progressively using more elaborate thinking processes in order to integrate the range of decision areas more effectively; working better as a team; and managing the time needed for the simulation more effectively (Vos, 2014).

All of these are learning processes, the progress of which can be roughly measured by the team's improvements on simulation performance indicators such as profitability and market share. The tutor also plays a critical part in supporting students with these learning processes. Essentially, the tutor has three roles in this regard: planning appropriate learning and teaching strategies, supporting student learning over time, and designing appropriate assessment tasks (Alklind-Taylor, Backlund, & Niklasson, 2012; Fanning & Gaba, 2007; Fripp, 1993; Sanchez, 1980; Vos & Brennan, 2010). How tutors undertake these roles with respect to simulation learning is another issue that has received limited attention in the research. And finally, little is known about how students perform on simulation assessment, and in particular the kinds of challenges both they and tutors find difficult to overcome.

This study is mainly exploratory and has the following main purposes:

- To address a gap in the literature on assessment strategies related to simulation games in general and by those using business simulation games in particular;
- To gain insights into what teaching, learning, and assessment principles and practices tutors make use of in designing assessment and supporting student learning from simulations and whether simulation assessment and pedagogy follows an authentic assessment model; and
- To consider what tutors perceive as the key weaknesses in student performance on simulation assessment and how they are attempting to redress these.

The paper begins with a review of the literature on authentic assessment and its main characteristics followed by a discussion of aspects of simulation game use that appear to fit these characteristics. This section is then followed by the framework for and the findings from an exploratory study on assessment practices taken from a sample of UK business and marketing who use simulation games. Consideration will be given to whether these practices fit with the main characteristics of authentic assessment and to the kinds of weaknesses tutors see in their students' performance. It is hoped that the findings from the study will provide simulation tutors with ideas for their own assessment strategies, as well as possible benchmarks for good practice. In addition, the research will provide a basis for future simulation assessment research and potentially add to the literature on authentic assessment.

## 2. Literature review

### 2.1. Trends in assessment research

Over the past three decades, research into assessment in higher education has tended to fall within three main themes: design, measurement and validity of assessment instruments; evaluating and providing feedback on student performance; and alternative forms of assessment to develop the learner (Sambell et al., 2013; Taras, 2002). The rise of alternative forms of assessment emerged out of the debates in the 1980s and 1990s over the educational value of standardised testing (also known as traditional assessment). Frederiksen (1984), for one, argued that large scale testing forces teachers to narrow what is taught in order to meet test requirements and Boud (1990) noted that too often "assessment tasks are set which encourage a narrow, instrumental approach to learning that emphasises the reproduction of what is presented, at the expense of critical thinking, deep understanding and independent activity" (p. 104).

Debate and criticism of assessment practices have come from within and outside of academia. In 1995, for example, the UK Higher Education Quality Council “opened up for public discussion the kinds of qualities and abilities which university graduates ought to possess and promoted scrutiny of the effectiveness of assessment in ensuring these outcome standards” (Sambell, McDowell, & Brown, 1997, p. 353). In both the US and the UK, parents, employers, and other external parties also questioned higher education practice for evidence that traditional assessments were really contributing to student knowledge and skill development (Banta, Lund, Black, & Oblander, 1996). A contingent debate emerged about the role of higher educational institutions in preparing students for employment, leading ultimately to a major emphasis on instructional and assessment practices that embed employability skill development (Azevdo, Apfelthaler, & Hurst, 2012; Ortenblad, Koris, Farquarsen, & Shih-wei, 2013).

One consequence of the testing debate was a shift into the foreground of alternative philosophies of education and assessment (Schell, 2000). Traditional assessment practices based on objectivist theories of learning gave way to assessment research based on cognitive/constructivist and sociocultural theories (James, 2005). The objectivist tradition generally views knowledge as existing independently of or outside the knower and it is the teacher who conveys meaning. Constructivists see learning as a process of active engagement through which learners construct meaning and new ideas, taking into account their current and previous knowledge. Learning is not, therefore, seen to be imposed or transmitted by direct instruction. As Schell (2000) notes:

The teacher provides the roadmap ... while allowing students to construct their understanding of the topic. Learners assume increasingly more control over ... learning and are free to explore the various ... details of the topic. They can build their own mental frameworks in ways natural to them. (p. 10)

Socio-cultural theories of learning, many of which are also constructivist in orientation, have been informed by the work of Dewey (1916), Vygotsky (1978), and more recently by Lave and Wenger (1991). They argue for the importance of context in learning. Vygotsky (1978) and Lave and Wenger (1991) situate learning within interactive groups, or as Wenger (1998) called them, ‘communities of practice’. This research has implications for how learners transfer knowledge learned in other contexts, as well as for the value of realistic or ‘real world’ learning situations.

While constructivism does not dictate specific approaches to teaching and assessment, many of its advocates have used constructivist ideas and tenets to inform an approach to curriculum design that calls for a closer integration of teaching, learning and assessment. Biggs’ (1996) theory of constructive alignment is an example. According to Biggs (1996), “students construct meaning through relevant learning activities” (p. 2), including assessment. The teacher creates alignment by establishing intended learning outcomes, and by determining the most appropriate teaching, learning and assessment activities to assist students in achieving the outcomes. If these aspects are not aligned, students are likely to spend much of their time preparing for what they believe will be on the test rather than learning the syllabus and teachers may be inclined to teach to the test, rather than to the full range of learning outcomes.

The rise of constructivist thinking and practice and of Biggs’ (1996) now widely adopted approach to curriculum design has led to a proliferation of forms of assessment alternative to traditional testing. Among the most widely discussed in the literature are competency based, performance-based, direct and authentic forms of assessment. While each of these has unique aspects they share a number of characteristics. All require students to actively engage with concepts, ideas and projects, involve ‘real world’ or professional contexts, involve clear assessment criteria, are challenging and include higher level thinking skills, and assess not only knowledge, but competencies and skills (Custer, 2000).

## 2.2. Authentic assessment

The alternative approach that has received the most attention in the literature is *authentic assessment*. Over the past two decades a number of conceptualisations of authentic assessment have been developed, all with the main objective of setting out processes and practices that are meant to better prepare students for future occupations than traditional assessment can do and to develop not only knowledge but higher level skills and competencies. While a consensus on its characteristics is yet to occur, the following eight themes incorporate most frameworks or discussions of authentic assessment:

1. The real world value of the assessment task;
2. Students perform or create a product as the output;
3. Challenge and complexity of tasks and issues of transfer;
4. Known criteria and assessment literacy;
5. Developmental opportunities with formative assessment and regular feedback;
6. Sufficient and varied activities to make up the whole;
7. Opportunities for reflection; and
8. Interaction and collaboration.

A brief overview of each theme and its characteristics is presented below followed by a further analysis of the scholarly research on authentic assessment.

### 2.2.1. *The real world value of the task*

For many authors, the real world value of the assessment task or tasks is the main determinant for authenticity (Ashford-Rowe et al., 2014; Cumming & Maxwell, 1999; Keyser & Howell, 2008; Lebow & Wager, 1994; Lund, 1997; Maina, 2004; Mueller, 2005; Reeves, Herrington, & Oliver, 2002; Reeves & Okey, 1996; Renzulli, Gentry, & Reis, 2004; Savery & Duffy, 1995; Tanner, 1997; Wiggins, 1993). Building on both constructivist and 'assessment for learning' theories (e.g. Sambell et al., 1997), authentic assessment calls for learning activities that mirror how performance would be undertaken in professional settings or in the 'real-world', particularly where the learning intention is for students to demonstrate a skill or the application of knowledge (Black, Harrison, Lee, Marshal, & William, 2003; Wiggins, 1993). The real world requirement emerged out of the original definition of authenticity presented by Archbald and Newmann (1988) in their counterpoint to the perceived failures of traditional assessment in preparing students for future work or learning. The authors, who first coined the term authenticity, wrote:

What counts for success in school is often considered trivial, meaningless, and contrived by students and adults alike. Ultimately then, the quality and utility of assessment rest upon the extent to which the outcomes measured represent appropriate, meaningful, significant and worthwhile forms of human accomplishment. We synthesize these qualities into one idea: authenticity. (Archbald & Newmann, 1988, p. 71)

Initially, therefore, the call was for more meaningful and significant assessment tasks, and not specifically for those representing real world or professional tasks. Over time, the greater focus in higher education on preparing students for employment has strengthened the importance of assessment that is work-oriented. Brown (2004), for example, notes:

If we want our students to demonstrate employability when they graduate, our assessments need to be designed to be *practice-orientated* [and apply] to professional contexts .... Rather than assessing a learner's ability to write about good practice, an effective assessment strategy [seeks] to measure how the student can put into practice the learning achieved. (pp. 83–84)

According to Sambell et al. (2013), the focus on real world activities also makes the assessment meaningful to students, and this, in turn, supports higher levels of motivation which can translate into better outcomes. Rust (2002) found that students are also more likely to take a deep approach to learning if they are intrinsically motivated and see the relevance and importance to their future.

### 2.2.2. *Performance or product as output*

The constructivist perspective that underlies authentic assessment views learning as the active creation of knowledge and a process "that ... changes the students' perspectives on the world so they behave differently" (Biggs, 2003, p. 36). Therefore, assessment should require student to provide an active demonstration of that learning either through a performance, a variety of performances or the creation of a product as output (Resnick, 1987; Torrance, 1995). In demonstrating the behaviours or practices required, students show that they have acquired not only knowledge but requisite skills and competencies. This does not limit assessment to active demonstrations of knowledge in the form of, say, presentations or carrying out specific tasks, but can also include written examples, as long as it reflects the kinds of understanding required in the discipline (see for example, Darling-Hammond & Snyder, 2000). Examples include: portfolios, open book exams, take away exams, projects and investigations, varied writing assignments, oral assessment, problem solving tasks, simulations, self, peer and co-assessment (Sambell et al., 1997). For some authors, the performance requirement is the basis for authenticity, over and above the requirement of a real world task (Biggs, 2003; Darling-Hammond & Snyder, 2000; Schell, 2000; Torrance, 1995).

### 2.2.3. *Challenge, complexity and transfer*

Authentic assessment should be challenging and represent the complexities and ambiguities of real world decision making as well as the potential for multiple solutions/perspectives (Gulikers, Bastiaens, & Kirschner, 2004; Kirschner, 2002; Newmann, Marks, & Gamoran, 1996; Petraglia, 1998; Reeves et al., 2002; Wiggins, 1993). Complex problems require higher order thinking skills such as analysis, evaluation and critical thinking and thus assessment should allow students to practice and develop these skills (Wiggins, 1993). Gulikers et al. (2004) argue that authentic tasks can vary in the degree of complexity depending upon the professional context to be simulated and the current level of the students' knowledge and skill development.

Another aspect of learning that has confounded teachers and researchers is how to get students to transfer learning from one context to another. Constructivists have argued that the transfer of knowledge from one domain to another is difficult, particularly given the fact that learning is context-based (Schell, 2000). For example, students who learn math in a math class may not be able to use those skills in completing a personal budget (see for example Lave & Wenger, 1988). Successful transfer of knowledge requires scaffolding, discussion with others, and opportunities for reflection, all themselves characteristics of authentic assessment (see below).

### 2.2.4. *Known criteria and assessment literacy*

In authentic assessment, teachers will expose students in advance to the main criteria upon which they will be evaluated and offer opportunities for students to become more 'assessment literate' through the use of exemplars or a dialogue to create

a shared understanding of what is expected (O'Donovan, Price, & Rust, 2004; Price, Carroll, O'Donovan, & Rust, 2011; Rust, Price, & O'Donovan, 2003). A social constructivist perspective posits that “meaningful understanding of assessment requires some kind of active engagement with the criteria by both tutors and students” (Rust, O'Donovan, & Price, 2005, p. 234), because “to truly understand ... the criteria and standards being applied requires tacit as well as explicit knowledge” (p. 231). Gulikers et al. (2004) further note that in professional situations employees are generally aware of the criteria on which their work will be judged, so it should also be transparent in the learning context. Their study on the benefits of authentic instruction did point out, however, that too many criteria can actually reduce motivation and learning (Gulikers, Bastiaens, & Kirschner, 2006).

#### 2.2.5. *Developmental opportunities with formative assessment and regular feedback*

Where assessment seeks to measure competency of a range of knowledge and skills, students should be given formative developmental or practice opportunities and be provided with regular feedback on their progress during completion (Ashford-Rowe et al., 2014; Crisp, 2012; Myers & Nulty, 2009). Giving students the opportunity to practice a skill or a set of actions is one of the main opportunities that formal education should provide. For each stage of practice, tutors can give feedback that will help students to understand where they need improvement and how they might move forward. Also, given that authentic assessments may involve a series of stages or steps, and that the success of future stages may depend upon earlier successes, practice and feedback are extremely important. Furthermore, practice, followed by feedback – either from the tutor or peers – allows students to demonstrate, over time, greater levels of competence and the application of higher levels of thinking (Darling-Hammond & Snyder, 2000).

#### 2.2.6. *Sufficient and varied activities make up the whole*

Authentic assessment should require students to engage in sufficient and varied activities to ensure that they cover all the associated learning outcomes or intentions rather than allowing them a choice of what to be assessed on (e.g. final exam with a choice of questions) (Rust et al., 2003). According to the principles of constructive alignment, assessment should cover all intended learning outcomes (Biggs, 1996). Furthermore, complex tasks require students to demonstrate a range of competencies that cannot be judged in a single test or activity so assessment “should involve a full array of tasks and multiple indicators of learning in order to come to fair conclusions” (Gulikers et al., 2004, p. 80).

In addition, as noted above, assessment should involve scaffolding, such that students are exposed to incrementally more challenging problems requiring progressive application of higher order thinking skills, and therefore more than one task is generally required.

#### 2.2.7. *Opportunities for reflection*

Reflection is a critical aspect of an authentic learning environment (Herrington, 2012; Herrington, Reeves, & Oliver, 2010; Lombardi, 2007; McAlister, 2000) and one that should be encouraged and guided. Boud, Keogh, and Walker (1985) see reflection as a natural process of having engaged in meaningful experiences. During reflection, students are exploring what they have done or learned in order to make new connections, form new understandings, but also to identify weak or missing links in knowledge or skills. In addition to the cognitive-structuring benefits of reflection, it allows students to consider their own approaches to learning. The latter, ‘thinking about one's thinking’, is termed metacognition and is important in assessments involving an array of tasks, complexity and formative feedback. It is also considered by many advocates to be essential to improving critical thinking processes (Ashford-Rowe et al., 2014; McAlister, 2000; Rule, 2006). Rule (2006) cautions that metacognitive skills do not come naturally to all, however, and reports on a study by Kramarski, Mevarech, and Arami (2002) showing that those who received instruction in reflection and metacognition within a cooperative learning project outperformed those who had no such guidance. Although not writing on authentic assessment, Jennifer Moon (1999, 2004) has also written extensively on the importance of helping students to develop these skills prior to asking them to undertake reflective activities.

#### 2.2.8. *Interaction and collaboration*

A number of researchers include collaboration as a necessary requirement of authentic assessment (e.g. Herrington & Herrington, 1998; Reeves et al., 2002) and base this requirement on social constructivist theories such as that of Vygotsky (1978). Vygotsky argued for the importance of social and cultural influences on learning and of social interactions as the means by which individuals make sense of the world. Interaction and discussion with more experienced peers and with tutors help students move towards greater levels of understanding and performance than could be achieved independently – particularly if those peers/tutors can scaffold the learning appropriately for the level of the student. Vygotsky (1978) termed the gap between current levels of understanding and what is possible with effective collaborative instruction as the *zone of proximal development*. Not all advocates of authentic assessment see collaboration with peers as a necessary requirement, however. For example, Gulikers et al. (2004) argue that students should only be working with others if the real world scenario upon which the assessment is based also calls for team working. On the other hand, they do agree that the tutor has an important role in scaffolding information and in providing feedback.

These eight themes summarise the main characteristics of authentic assessment as it has developed in the literature over the past twenty plus years and provide a framework for the tutor. Most themes represent good stand-alone practices but when interlinked with the others can provide greater learning benefits. Biggs (2003), who considered authentic assessment

to be a good example of constructive alignment, also noted that its effectiveness is enhanced when it is aligned with authentic instruction and in fact the two are often combined into authentic instruction or pedagogy or termed an 'authentic learning environment' (Newmann et al., 1996; Sambell et al., 2013). The underlying premise is that instruction and assessment are interdependent and for assessment to be effective it needs to be grounded within an instructional pedagogy.

### 2.3. *Authentic assessment research*

Empirical research into the effectiveness of authentic assessment in terms of student learning gains as compared with other forms is somewhat limited. Some studies have attempted to demonstrate the value of authentic assessment in motivating and engaging students (Fook & Sidhu, 2010; Gulikers et al., 2004; O'Donovan et al., 2004; Wellington, Thomas, Powell, & Clark, 2002) while others have investigated student perceptions of the value of authentic assessment over other forms (Sambell et al., 1997; Saunders, Saunders, & Batson, 2001), generally with positive results. Studies demonstrating a measurable and positive impact on student performance have been less frequent but include that by Newmann et al. (1996) who found authentic pedagogy to be a strong predictor of achievement in school children, and that of Jackson, Draugalis, Slack, and Zachry (2002) who found measurable improvements in student achievement on a pharmacy programme. Saunders et al. (2001), however, found that authentic assessment improved cognitive skill development only slightly over other forms of assessment and Gulikers, Bastiaens, and Martens (2005) did not show that authentic learning environments resulted in higher student performance than those considered less authentic.

More studies are needed into whether authentic assessment contributes to greater learning gains than other forms of assessment as it has not yet been demonstrated convincingly. McAlister (2000) notes that one of the key challenges in measuring the performance-related benefits of authentic assessment is the existence of so many small but noteworthy differences in how it is conceptualised. Studies are also needed that consider how other factors may affect the success of these kinds of assessments. For example, only a few studies have looked at the role of the student. In their research, Fook and Sidhu (2010) found that most students valued authentic assessment as they felt it helped them to develop more skills than traditional tests and was more beneficial to their future work, but many students also admitted that they did not really put in much effort to get the best out of these assessments. Others found that assessments of this kind 'were a sheer waste of time' and that with portfolio type assessments, for example, 'they did not know what to write ... [and] were most of the time repeating the same thing' (p. 158). Tutors also found that many students remained quite passive and resistant to the active involvement required, that plagiarism was an issue, and not all members of a group assignment did their part. In summary, additional studies on how best to implement authentic assessment and on ways to overcome barriers to its effective use are also needed.

The much more prolific non-empirical studies on authentic assessment – many of which have been investigated to generate the eight themes above – have sought to conceptualise the concept, link it to learning theories, develop models, build upon previous theoretical frameworks, and to bring in empirical research from other studies to show where various characteristics have demonstrated a contribution to student learning gains (Ashford-Rowe et al., 2014; Cumming & Maxwell, 1999; Custer, 2000; Keyser & Howell, 2008; Myers & Nulty, 2009; Newmann, Secada, & Wehlage, 1995; Newmann & Wehlage, 1993; Petraglia, 1998; Reeves et al., 2002; Rennert-Ariev, 2005; Rule, 2006; Saunders et al., 2001; Schell, 2000; Swaffield, 2011). Many of these studies are of the benchmark or best practice kind that tutors can use to compare their own assessment values and practices against (Price et al., 2011), while others are meant to stimulate debate and discussion (Boud & Falchikov, 1999) or to identify appropriate methods to use (Darling-Hammond & Snyder, 2000; Galarneau, 2005; Herrington & Herrington, 2006; Lebow & Wager, 1994), among them simulation games, the characteristics of which and the relationships to authentic assessment are described below.

### 2.4. *Simulation games, authentic assessment and student performance*

As noted above, one characteristic of authentic assessment is the underlying notion that for learning to occur, it should be demonstrated through a performance or the creation of a product as output. In other words, learners must demonstrate their knowledge through action and gain that knowledge through experience (Siemens, 2004). Simulation games, particularly in business and marketing, are designed to represent as much as possible the real world decision making context. In marketing simulations, for example, student teams compete to launch and/or tailor products for different target segments in order to maximise profits. In addition to attempting to match product features to target market needs, teams are generally required to set prices, both at retail and channel level, allocate money for promotion, set production levels, invest in research and development and purchase market research reports, among other tasks. Teams will make these decisions regularly (e.g. weekly) for six or more game rounds and receive feedback in the form of financial reports, market and customer data, and competitor information, all of which must be interpreted and analysed for the next decision round. This active form of learning based on a 'simulated' real world decision making environment can be seen to have many features of authentic assessment. In addition to the real world aspects, there is complexity with uncertain outcomes, the need for students to use higher level decision making skills such as problem solving, analysis and synthesis of a range of current and previous information/learning, all made within a collaborative team. Add to this the role of the tutor in providing feedback, room for dialogue, conditions for reflection, and specific assessment tasks, the simulation experience, can, when properly managed, be seen as a good example of authentic pedagogy (see for example, Galarneau, 2005).

On the other hand, playing a simulation game, or undertaking an alternative form of assessment, does not itself guarantee that the learner will be able to enact or demonstrate the kinds of behaviours and outcomes envisaged from a well-designed authentic assessment regime as [Fook and Sidhu \(2010\)](#) demonstrated in their research. Student engagement and the activities undertaken by the tutor are also critical. The tutor needs to set an appropriate set of cues, conditions and activities. [Aldrich \(2005\)](#), for example, stated that one of the most critical components of the simulation experience is the pedagogy that underpins it – a point of view similar to that of [Biggs \(1996, 2003\)](#). Simulations are most effective, [Aldrich \(2005\)](#) argues, when the tutor provides additional background material (including case studies), scaffolding (breaking the learning into parts/chunks and providing support or resources to help the student understand), debriefing/feedback opportunities, coaching, and periods for student reflection and analysis. In addition, the simulation itself needs to provide effective diagnostic tools (such as financial and market reports). Clearly, many of [Aldrich's \(2005\)](#) criteria for an effective simulation learning experience are similar to those of authentic instruction.

[Aldrich \(2005\)](#) is suggesting that the type of assessment used and the simulation itself will not guarantee that students who play them will demonstrate more or more complex learning outcomes than from other forms of assessment. [Astin \(1996, 2012\)](#) also argues for the important role of the tutor and other environmental factors in determining the effectiveness of any kind of assessment, but emphasises the important role played by the student. [Astin \(1996\)](#) developed the IEO (inputs, environment, outputs) model to help improve how we measure the effectiveness of one form of assessment over another. He argued that without considering both what the students (inputs) bring to the process and the environment/context in which they engage in assessment and learning, we cannot make valid judgements about why students achieve certain outputs (e.g. grades).

Applying the idea of the 'student factor' to authentic assessments such as simulations, for students to benefit, they must also bring something to the table. [Astin \(2012\)](#) categorises student inputs as either fixed, such as demographic and educational background characteristics, and those that can vary over time such as 'cognitive functioning, aspirations and expectations, self-ratings, values [and] behavioural patterns ([Astin, 2012](#), p. 76)'. These factors can influence the amount of time a student spends on the simulation; motivation to engage in the game; perceptions of the value of the simulation and related assessment; ability and willingness to make use of feedback; capabilities for higher order thinking, and the ability to transfer knowledge and skills learned elsewhere such as numerical and financial skills.

In addition, the environment of the simulation – including the game itself and the tutor's behaviour/actions – can affect students' performance. Prior research has shown that a poorly prepared tutor or teaching team is a threat to student learning on simulations. If the tutor does not know the game well, has not spent time to understand the likely outcomes of various types of decisions, does not manage student stress and emotion well, and provides poor or inaccurate feedback, then students are unlikely to either engage with the game, learn much or get good grades ([Hofstede et al., 2010](#); [Pearson & Smith, 1986](#); [Taylor, Backlund, & Niklasson, 2012](#); [Tiwan, Nafees, & Omkumar, 2014](#); [Vos & Brennan, 2010](#); [Wolfe, 1997](#)).

In summary, authentic assessment – a concept built upon a number of principles of effective assessment, and one that is grounded in a 'real-world' learning situation – reflects many features of the simulation game experience. At the very least, the literature on authentic assessment offers evidence-based principles upon which tutors can benchmark their assessment strategies. However, no matter how well designed the assessment is, other factors such as student characteristics and environmental factors can also affect the assessment structure and outcomes. An authentic learning experience or an authentic assessment will not create itself. The willingness of the student to engage with the simulation and their prior skills, and the role of the tutor in structuring the experience plus the assessment tasks is critical to participants gaining the maximum learning benefits.

The research undertaken for this paper involved a small empirical study meant to provide some insights into the kinds of assessments tutors use on simulation modules and to gauge whether the characteristics of authentic assessment can be found within the game environment itself as well as in the strategies tutors use to support and assess student learning. In addition, through an interpretation of the findings from the surveys and interviews undertaken, the study will also highlight factors, particularly those related to student characteristics, that might challenge the ability of simulation tutors as well as others who use authentic assessment to gain the purported benefits in terms of preparing students for future employment, and in increasing knowledge and skill development. The study will demonstrate that while authentic assessment is deemed by many as a highly effective way to structure the teaching and assessment in a discipline area, how students respond to these activities as well as what they bring to them can have an impact and should be considered when researching its benefits.

### 3. Method

This exploratory study into assessment practices and outcomes on simulation based modules used both quantitative and qualitative research methods. Thirty-five university tutors in the UK known to use or have used simulations within the past five years completed a survey and eight of the survey respondents were then contacted for further depth interviews. The sample is not representative of the population of those using marketing and business simulations in the UK as no sample frame exists and no census of simulation use in the UK has been carried out since [Burgess's \(1991\)](#) study found that 92% of UK Universities used or had used simulations in business courses. The findings from this study will therefore be used to draw some preliminary conclusions about simulation assessment practices, the impact of student factors on assessment outcomes, and areas where tutors may find it challenging to get the most out of authentic assessment regimes.

### 3.1. Survey instrument

Research by Vos and Brennan (2010) identified that those using simulation games tend to be lone enthusiasts working either by themselves or with small teams. Therefore, it was felt that a survey would be the best means by which to access a sample of these game users and to gather a breadth of information. The surveys were sent online via the survey tool Smartsurvey<sup>®</sup> to 70 simulation users in the UK known by the author. Seventy one percent of those who responded use marketing simulations, however those using other business simulations were also included. Emails were individually addressed, but the results were anonymised. Characteristics of the thirty five people who completed the survey can be found in Table 1.

The survey was composed of three sections. The first included 9 background questions related to length of time using simulations, simulation game(s) used, number of students taking the simulation annually, size of the teaching team and size of student teams, among others. The rationale for the background questions was to draw out any key differences in assessment strategies of those who had been using simulations for a greater length of time, with larger groups, or with different types of simulations. No major differences were subsequently found except that those who had smaller groups tended to use about one more formative assessment than those with smaller groups. The next section included questions about the types of formative and summative assessments students undertook and whether the summative assessments were group-based or individual. While these questions included a range of options to choose from, respondents could also add additional information in an open-ended section. Five other open-ended questions were included to allow respondents to comment on why they use simulations, to reflect on what aspects of the assessment students tend to struggle with, what types of students or student behaviour may account for weaker performance, and what aspects of their assessment tutors felt were most effective.

An important purpose of the study was to investigate whether simulation tutors tend to apply principles of authentic assessment and pedagogy when designing their teaching and assessment approaches. While this was considered in more detail in the interviews, the third section of the survey asked tutors to rate their level of agreement with statements related to using reflective assignments, using group/collaborative work, the importance of regular feedback to student success, and whether students were given developmental opportunities – all tenets of authentic assessment. When the findings from this section were combined with an evaluation of the number of formative and summative opportunities given to students and their reasons for using simulations, as well as findings from the depth interviews, some conclusions could be drawn about the degree to which tutors use authentic assessment.

**Table 1**  
Survey respondent characteristics  $n = 35$ .

	Frequency	Percentage
Gender ( $n = 35$ )		
Male	30	86%
Female	5	14%
University sector ( $n = 35$ )		
Russell Group	5	14%
Post '92	30	86%
Faculty position ( $n = 35$ )		
Full time	34	97%
Adjunct faculty	1	3%
Main discipline ( $n = 35$ )		
Marketing	25	71%
Business/strategy	8	23%
Accounting	2	6%
Games used ( $n = 57$ ) <sup>a</sup>		
Markstrat	11	
Simventure	9	
Cesim Simbrand	7	
The Marketing Game	6	
Other:		
Marketing based	14	
Business/strategy	3	
Accounting	1	
Not specified	6	

<sup>a</sup> Respondents were asked to state which games they use or have used in the past, so  $n > 35$ .



### 3.2. Interviews

The interviews were conducted to gain a more in-depth understanding of tutors approach to assessment design, how they describe their own pedagogical strategies and approach, their perceptions of why some students perform less well, and to gauge the degree of alignment between their approaches and that of authentic assessment principles. Eight semi-structured interviews were conducted amongst survey respondents who agreed to participate. Characteristics of those interviewed can be found in Table 2.

An interview guide document was used and each lasted between 40 and 60 min. Following some background questions related to game use, the questions asked for details of assessment used, various aspects of their assessment practice that could be viewed as evidence of authentic pedagogy, and further discussion of student strengths and weaknesses in performance.

## 4. Findings

In the discussion of findings, highlights from the survey background information are first presented to give a feel for where simulations fit in the curriculum, how the simulation is structured and who uses them. This is followed by a summary of both survey and interview findings that relate to each of the eight characteristics of authentic assessment. Given that neither the survey nor the interviews asked specifically about authentic assessment and given that aspects of authentic assessment tend to overlap in their descriptions, some assumptions have been made as to which characteristic the tutor could be seen to be referring to. The section concludes with survey and interview findings related to weaker student performance.

### 4.1. Background questions (survey)

Table 3 provides highlights from the background questions. The majority of respondents (80%) have been using simulations for more than 8 years, predominantly with students in their final undergraduate year or on a postgraduate programme, but all years are represented. In 71% of cases, students work in team of 4–5 people. There is a great deal of variation in the number of simulation students that tutors are responsible for, with some managing over 500 students annually (and up to 900 in one case) and others leading much smaller cohorts. Given that tutors often have colleagues supporting their simulation modules, this survey showed that the median group size that tutors are responsible for is 35 and the average is 45.

### 4.2. Aspects of authentic assessment

In neither the survey nor the interviews was the term ‘authentic assessment’ used. Since one of the main objectives of the study was to gain insights into the degree to which simulation tutors use authentic assessment principles, whether or not they are familiar with the concept, it was deemed important not to introduce the concept or discuss any particular approach to assessment design. Only seven of the eight characteristics described above are discussed below as the second characteristic

**Table 2**  
Interview respondents characteristics ( $n = 8$ ).

Characteristic	Frequency	Level
Gender		
Male	6	
Female	2	
Faculty position		
Full time faculty	8	
University type		
Russell Group	2	(Both using Markstrat at postgraduate level)
Post '92	6	
Main discipline		
Marketing	8	
Types of simulations used		
Marketing		
• Cesim Simbrand	3	(1 at Postgraduate, 2 at final year undergraduate)
• Markstrat	3	(2 at Postgraduate, 1 at final year undergraduate)
• Market2Win	1	(1 at Final year undergraduate)
• Kam2Win	1	(1 at Final year undergraduate)
Average number of years using Simulations	7.6	
Median years using simulations	6.5	

**Table 3**

Highlights from survey background questions.

	Frequency	Comment
Years working in higher education	8+ years (80%)	17% (5) Who have been working in higher education for more than 8 years have just begun using simulations
Number of times using a simulation game	3–7 times (33%) 8 or more times (44%)	
Year/level at which simulations are used:		<i>Simventure</i> is used mainly at level 1.
Year 1 (level 4)	12.8%	<i>Markstrat</i> is mainly used in final year undergraduate, in postgraduate and executive education
Year 2 (level 5)	14%	
Year 3 (level 6)	31%	
Master's (level 7)	27%	
Executive education	12.8%	
Size of team for simulation (on average)	4–5 Students (71%)	
Amount of time simulation runs		All 3 tutors who used the game over a block of 2–3 days did so at postgraduate or executive education
6–7 weeks	23%	
8–9 weeks	23%	
More than 12 weeks	17%	
Over a block of 2–3 days	9%	
Number of students taking simulation annually		
Median size of group per tutor	35	Number of students each tutor was responsible for varied from 9 to 900 annually
Average size of group per tutor	45	

– ‘students perform or create a product as the output’ was assumed to be an inherent characteristic of playing simulation games.

#### 4.2.1. The ‘real world’ aspect

The findings in this section come either from the open-ended comments on the survey or from the interviews. Comments tend to coalesce around two main themes: the benefits to student learning of the ‘real world’ aspects of the simulation itself and ways in which the tutor sought to further enhance the realistic or real world aspects of the simulation through other teaching activities.

Three interview participants commented on the value of the simulation's realistic view of business:

*‘Simulations are better at giving students a comprehensive view of a business, business functions (management, finance) and how things fit together ... few things can do this ...’*

*‘I use [simulations] to teach students to think at the strategic level of business decision making – something difficult to learn in other settings’*

*‘It brings selling to life for them. [The simulation] allows students to perform [sales management] ... tasks ... it's hard to get this form of hands on learning in any other way’.*

Although the simulation is representative of real world decision making, some tutors go to great lengths to include even more ‘reality’ by finding examples for the lecture or by placing students in business related roles as part of their assessment.

*‘In every lecture, I spend time talking about how [a] particular aspect of [the simulation] relates to real world examples.’*

*‘[Students] are told to present to potential investors and to ask for [business] funding ... The class votes on whether or not to invest – a bit like Dragons’ Den’*

*The group presentation is an executive brief to an advertising agency for one of their team's products. They then have to create an advertisement to their brief.*

Some tutors also required students to do extra research on actual companies similar to those in the simulation:

*‘I [also] bring in the real world – I ask them to have a look and see what the actual mobile phone companies are doing ... What are their strategies? See if the conditions they are facing or have faced are similar to what their team is facing’*

*‘As part of their written report, students need to conduct research into how the actual industry is performing and if there are similarities to the company they ran in the simulation.’*

*In the [summative] assignment, they link what is learned in the game to another, real, company*

Interestingly, however, one tutor teaching on a third year module received complaints from students that the simulation was not 'sufficiently realistic'. However, his point of view was that

*'... more realism leads to more complexity and I believe less [student] understanding. I think it is important that any simulation game is not too complicated so that students can understand some general principles.'*

This comment reflects the point of view of those authentic assessment advocates who believe that the 'real world' aspect should represent the level of the students and be tailored for their learning abilities and needs (Gulikers et al., 2004; McAlister, 2000).

#### 4.2.2. Complexity, challenge and transfer

Many tutors commented on the value of simulations for teaching higher level thinking skills such as analysis, problem solving and critical thinking, all seen by them as important for students future work. One interviewee noted: 'I design my assessment specifically for the development of higher order thinking skills'.

The simulation itself was seen as a good vehicle for allowing students to practice and develop more advanced skills:

*'games are good for developing problem solving and analysis skills and for critically reflecting on decision makin'*

*'marketers need to be able to undertake analyses of large amounts of quite complex data sets – simulations help prepare them for that'*

*'simulations allow students to engage with some of the more complex concepts and processes in marketing such as sales forecasting and price setting'*

In order to achieve good results, games are designed to encourage teams to take a strategic approach and to integrate a number of decision areas (e.g. pricing, promotion, product features, R&D spending) to help achieve strategic objectives. One tutor commented:

*'I require students to come up with a strategy then stick with it for up to three decision periods. I want them to see how challenging this can be ... it is hard after all, not just for students but for managers. So simulations allow them to practice these skills.'*

With respect to the uncertainty that attends decision-making, simulations provide a valuable perspective:

*'they learn that no matter how well they have thought out their strategy or decisions, you cannot guarantee good results – other factors such as the market environment and competitors' strategies affect team position and success ... and this is a key [business] lesson'*

Many tutors are aware of the value of simulations for allowing students opportunities to link theory to practice and for allowing tutors opportunities to teach related but perhaps more challenging concepts. In one MBA class, for example, the tutor used the simulation, in part, to demonstrate the value of more complex analytical tools such as conjoint and factor analysis.

In other cases, respondents commented that simulations act as a 'live' context where students can see both the value and the weaknesses of theoretical models they had been taught and in two assessment cases, students were asked to reflect on the value of particular theories they used in the game and to critique their value.

Most tutors do not simply tell students to use theories to help them make better decisions in the game. Rather, they take time in lectures and seminars to demonstrate how theories are at work in the simulation, how they could be applied, and how they can be used to improve decision making.

*'I use a number of different approaches to try to get students to link theory with the simulation ... in each debriefing session, I show them the type of strategy they are using ... I might say, this looks like a follower strategy ... I then point them to articles on this strategy ... whenever I introduce a new concept in the lecture, such as positioning or product portfolio, I discuss its role in the game ...'*

Despite the additional sessions on linking theories to the game and despite the expectation that students will be able to transfer in knowledge and skills gained elsewhere in the curriculum (e.g. finance and numeracy skills to interpret team results), most tutors noted in either open-ended survey comments or in the interviews that students continued to struggle with these processes. More will be said on this later in the paper, but it became clear from the findings that designing authentic learning environments with embedded complexity, challenge and the requirements for knowledge transfer as well as additional teaching support does not guarantee that students will be able to manage them.

#### 4.2.3. Known criteria and assessment literacy

One survey question asked respondents if they expose students in advance to the criteria on which they would be assessed – a recommendation found in almost all discussions of authentic assessment. Thirty three out of 35 or 94% said they did.

All interview respondents discussed practices they use to ensure that students know how they will be graded and on what criteria. These included setting time aside in lectures to go over the assessment brief; providing and explaining rubric sheets;

showing examples of good and weaker assignments from previous years, and setting specific tutorials to answer questions about the assessment. Commenting on the value of these practices, two tutors noted:

*'I think it is very important to explain to them how to do it as it is new to them. And of course I give feedback on their drafts in order to show them if they are on the right track'.*

*'I think the presentation briefing that I use ensures that students deliver very high quality presentations'.*

#### 4.2.4. Developmental opportunities with formative assessment and regular feedback

To construct knowledge and develop meaning, students need practice opportunities (Schell, 2000). Formative assessment provides such opportunities, particularly where the tutor then gives feedback. From the survey findings, it is clear that the vast majority of respondents are committed to using formative assessment. From the question asking respondents to choose the types of formative assessment provided to students and add further comments, 115 responses were gathered and the responses summarised in Chart 1. The most common type of formative assessment reported is regular feedback from the tutor on team decision results (77%). It appears that an additional five (14%) respondents do provide some form of regular feedback to teams as they responded positively to a later question about the importance of tutor feedback to team performance or as part of the question on what they deemed as particularly effective about their assessment strategies. Overall, 91% of tutors either agreed or strongly agreed that the regular feedback they provide to teams is fundamental to improving students' knowledge and performance in the game.

Whether it is through dialogue with teams, reflective online logs/essays, presented or written marketing/business plans, or reading students' draft reports, tutors provide students with developmental opportunities as recommended in authentic assessment. Students are exposed to, on average two formative assessments, with 37% of tutors using three or more forms. Given the additional feedback given each week by the game software itself, students have many occasions to practice, develop their knowledge, and to engage in more complex thinking. A summary of comments on formative assessment is provided in Table 4.

#### 4.2.5. Sufficient and varied activities make up the whole

As noted above, authentic assessment should allow students to engage in sufficient and varied activities to ensure that they cover all the associated learning outcomes. Clearly, making regular decisions, whether over a short intensive period or over 6–10+ weeks, and then having the opportunity to interpret results are examples of the regular activity provided by simulation's themselves, as are the formative assessment tasks provided by tutors. However, it is the summative assessments that allow the tutor to judge the student's learning outcomes. As with the question on formative assessment, respondents could select from a list of different types of summative assessment but were able to describe other forms used in an open-ended section. The results are summarised in Chart 2.

Interestingly, only three respondents use game performance indicators (e.g. profit or market share) as part of the summative assessment, giving 5, 10, and 20% respectively for this component, one commenting that this added to the 'real world' aspect of the assessment. During the interviews many tutors noted that they do not grade students on game performance as early success by some teams can demotivate others and luck rather than skill can play a part.

In terms of the number of summative assessments used, results need to be interpreted with caution. First, the survey did not ask for the length or number of words required per assignment and second, it was not always clear whether the simulation formed part of a module (with additional assessment) or was a stand-alone module. From the results, it appears that 46% of tutors used two assessments to grade student learning from the simulation, the most common forms being a final

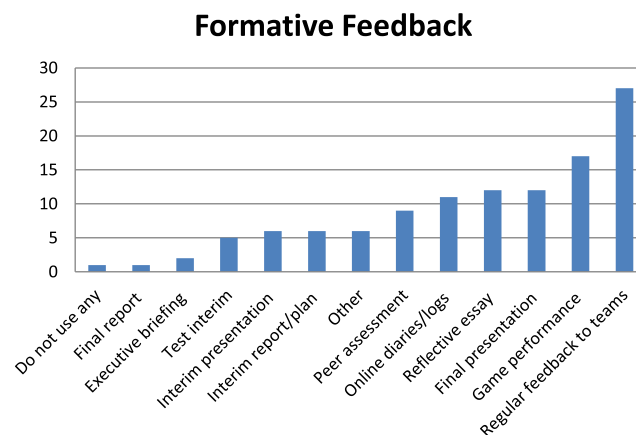


Chart 1. Types of formative assessment used,  $n = 115$ .

**Table 4**

Respondent comments on how they provide developmental opportunities.

- “They get 7 feedback opportunities on written work and feedback each week on their results”.
  - “I think getting formative feedback after each round of decisions in the simulation is useful, and adds a sense of realism to the simulation. The students can also analyse their own performance using the simulation software – and look at financial and market data to assess if they are in the right opportunities or not”.
  - “[I give students a] series of critical journals and critical reports that allow for critical steps to be repeated and comparisons to be made throughout the simulation”.
  - “What helped the students most was the regular advice they would get from the course lecturer and instructor to student teams on their performance and ways to improve, which was provided via informal conversations during the seminar”.
  - “Week-by-week tutor feedback to each team is essential and highly effective”.
  - “Series of three presentations over a whole semester, with immediate face-to-face and written feedback; groups have the opportunity to consolidate and practise new learning gained as a result of feedback”.
  - “I think we have the balance right. Where the performance in the simulation game is not assessed it allows students to make and learn from their mistakes, and take risks without it affecting their grades. The formative assessment works well as a reflective essay, allowing the students to individually reflect on what they have learnt”.
  - “... the formative feedback is very useful to help them with reflecting on their decision-making”.
- “Each week, students must answer three questions via their online team log: what results did you achieve last round and why; what lessons are to be learned about marketing concepts”.

group report (56%); a reflective individual assignment (56%), and/or a final group presentation (25%). Three respondents included questions about the simulation in a final exam, and four required students to conduct extra research as part of their final report.

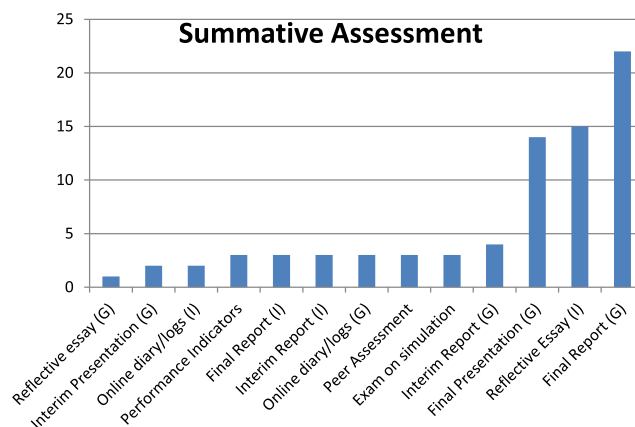
Six of the 9 who used three or more forms of summative assessment also graded interim presentations or reports. Of these six, five were able to provide feedback to students on the first assessment before the next assignment was due, thus allowing additional developmental opportunities. In total, 82% required all of the summative assessment to come in after the simulation game was completed. Whether this was due to institutional, time, cohort size or other reasons is not known. However, as we have seen, in all cases but one, students were also getting formative assessment opportunities.

If we consider together the regular, often weekly decision making, the range of formative assessment opportunities (from 2 to 4+) and the summative assessments (from 1 to 3+), students appear to have many opportunities to test their level of skills or knowledge and to do so in a variety of ways. In only one case were students given just a single summative assessment in addition to the practice rounds of decision making.

#### 4.2.6. Opportunities for reflection

The study provided four ways in which tutors could comment on their use of reflective practice. The questions on the types of formative and summative assessment used each included ‘reflective essay’ as a choice. A survey scale question also asked respondents to comment on their attitudes towards reflective assignments and finally, interview participants were asked directly about use of reflective assessments.

From the data on types of assessment, 71% of tutors explicitly asked for a reflective assignment (either formative or summative), and an additional 4 (11%) asked for reflective online diaries or logs. The scale question that sought to gauge tutors’ attitudes towards the value of reflective assignments (*‘reflective assignments are good at getting students to analyse their simulation performance and decision making’*) produced agreement from 89% of respondents, with the majority (53%) feeling very strongly about their benefits. It is important to note that the surveys may have under-reported tutors use of or positive

**Chart 2.** Types of summative assessment used.

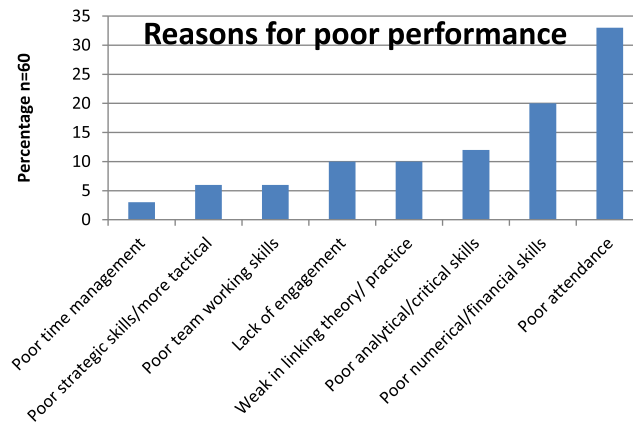


Chart 3. Reasons given for poorer student performance.

feelings about reflective assignments because of differences in terminology used. For example, one tutor noted that he did not like reflective assignments, but he used critical journals but then described these in terms others would see as reflection.

The interviews provided opportunities for tutors to comment on both how they interpret 'reflective' assignments and how they use them:

*'Reflective essays provide freedom to students to assess their own learning'.*

*'[I am] keen to have them reflect. Reflection is about looking at what you did right and what you did wrong and about explaining what you would have done ... It is about reflecting on one's own performance ... could I have worked harder? And about the group dynamics'.*

*'[Individual] reflective assignments are better than group assignments ... I want them to reflect'.*

As noted above, reflection on academic work does not necessarily come easily to students (Moon, 1999; Rule, 2006) and yet only one tutor commented on the importance of preparing students:

*'We spend time in the seminar talking about Gibbs reflective cycle and how you do a reflective piece of work. I think this helps as most students say they have not had to do this kind of assessment before and don't know how to do it'.*

As will be shown below, not all students are able to write effective reflective assignments, however.

#### 4.2.7. Interaction and collaboration

The findings related to the value of collaborative work and interaction with peers are somewhat mixed. While all those interviewed saw the benefits of collaboration between students, most have, at one time or another, struggled with issues related to group work. The problems discussed relate mainly to complaints about particular members not contributing. For this and other reasons, five of the eight interviewed participants feel that while the students benefit greatly from working in teams on the simulation, they should be assessed individually on their learning. Responses to a survey scale question about group work (the biggest problem with simulations is group work) also brought a mixed response with 40% agreeing with the statement, 28.5 disagreeing, and 34% opting for a neutral response.

It appears that collaboration as a concept is widely supported as beneficial to student learning, but many have challenges putting the benefits into practice for all students. For example, one tutor spoke about the benefits of giving students different roles within the team, similar to what they would experience in a work setting, but felt that when it came to assessment, individual assignments were fairer. Another tutor who has been using simulations for over 20 years had an even stronger response:

*'I got fed up with the group problems – free riders, complaints about who was not contributing – so I changed the assessment such that each person could decide on which area or two areas they wanted to research and write and then I give individual marks for their sections'.*

However, despite the considerable literature on how student teams can increase their effectiveness if they are first encouraged to intentionally focus on team processes (see for example, Kayes, Kayes, & Kolb, 2005), only one tutor interviewed provides training in how to enhance group effectiveness.

#### 4.3. On what students do well and not so well

From the findings discussed above, it is clear that the vast majority of those involved in this study use terminology related to all aspects of authentic assessment in designing their teaching and assessment strategies for simulation games. As noted

above, however, the literature on authentic assessment is rather limited about the challenges that may occur when using authentic assessment in the classroom. Both the survey and interviews asked respondents to comment on areas where students performed less well and what student characteristics might contribute to lower performance.

From the open, ended survey questions about performance, thirty three respondents provided 60 comments with the remaining two noting that their students performed well on all aspects of assessment. These comments were condensed into eight main themes as shown in [Chart 3](#). The main reason given for lower performance was poor attendance, however, skill weaknesses, when added together, represent a greater problem. Weak numerical and financial skills (20%), poor analytical or critical thinking skills (12%), challenges in linking theory to practice (10%), problems thinking strategically (6%) and poor team working skills (6%) all contribute to weaker performance on simulation assessment.

These and the findings from the interviews have implications for those who are using authentic assessments. First, it appears that despite the desire to find assignments that engage and develop higher level thinking skills, students often struggle. Interviewees provided further detail on student performance. Many commented on the fact that students tend to be more descriptive than analytical in their reports, presentations and reflective assignments, even when they are given exemplars from previous years and coaching by the tutor. In addition they said more on how students struggle with linking theory to practice and in transferring skills learned elsewhere. The problem with numeracy skills was made stark in responses to a related survey question: 71% either agreed or strongly agreed that weak numeracy skills held students back from getting the full benefits of the simulation and from performing really well in assessments.

With respect to developmental opportunities offered through formative feedback or in preparing students for assessment, tutors complained that many students did not come to the relevant sessions, read the feedback provided, or knew how to make use of it. For some, this appeared more as a result of poor motivation on the part of students rather than lack of ability. Poor attendance at decision making sessions was often cited as a reason for poor. Student's unwillingness to read the simulation documents in sufficient detail or any additional readings was also cited. As noted above, motivation and engagement issues also caused tension within teams and with group based assignments. So despite the efforts of tutors to create a real world experience with significant potential for developing knowledge and skills and in providing a lot of learning support, if students choose not to engage, the benefits of many authentic assessment tenets are lost.

It must be noted that not all tutors commented on poor performance and even those who did also have much to say about how students who did engage benefited. One tutor found that the addition of a simulation to a module helped to increase overall performance and another noted that she usually had some very good students:

*'... stronger students are able to discuss the difference between challenges, decisions and outcomes and are further able to see the appropriateness and relevance of applying theories to practice'.*

Furthermore, almost all respondents gave examples of students who struggle with the game for some or many weeks and then suddenly have that moment of understanding:

*'One of my students struggled all the way through and just copied the strategies of other teams until one day she just 'got it' ... it was amazing to see her confidence grow and the improvement in her work'*

*'We had a group who didn't take the game very seriously ... then suddenly they leapfrogged it, they got it and you could see that a huge amount of learning was taking place'*

*'If someone [in the group] presses the button and then they get it, it's very powerful'.*

Such learning 'eureka' moments provide a great deal of satisfaction for both tutors and students and it could be argued that without the significant opportunities for practice and feedback that authentic assessments simulation environments provide, they may not occur so starkly or so often.

## 5. Discussion

The research findings provide strong support for the contention that tutors who use simulations employ many if not all of the characteristics of authentic pedagogy when designing their teaching and assessment activities even though no respondent mentioned this terminology. Most use simulations to provide a real world experience that allows students to develop the kinds of skills and competencies they will need in their working lives. Tutors are particularly committed to using formative assessment and providing even more developmental opportunities than the simulation itself offers, and to ensuring that students know how they will be assessed. Although most summative assessments are limited to two or three, possibly due to institutional constraints, tutors do provide variety and, for the most part, a full range of tasks to capture a breadth of student learning preferences and to allow for knowledge and skill development. In addition, the majority see reflective activities of as a means for students to really interrogate their own learning and to make connections between theory and practice. Although group problems often emerge (generally because one or more members does not contribute), all see the benefits of team work and collaboration in helping students to learn and fill the gaps in their learning ([Vygotsky, 1978](#)).

The research has also added insights into the challenges of implementing authentic assessment practices, a theme that is rather limited in the literature. Student skill weaknesses and levels of motivation to really engage with the simulation and assignments are key issues that those using authentic assessment really need to grapple with. Similar to [Fook and Sidhu \(2010\)](#), this study found that tutors often struggled with group problems and students resistance to engage. Although

students were not interviewed for this study, comments from tutors confirmed what Astin, 2012 said about the impact of student characteristics on performance, including those related to ‘cognitive functioning, aspirations and expectations ... and behavioural patterns’ (Astin, 2012, p. 76).

Diversity of learner groups is a characteristic of higher education today, particularly given the government agenda for widening access and participation (see, for example, [hefce.ac.uk](http://hefce.ac.uk)). Students within programmes are therefore likely come with a range of different learning characteristics and backgrounds. Like Astin (1996), Biggs (1989) also researched the impact of student factors on learning performance. He called these characteristics presage and process factors. *Presage* factors include differences in prior knowledge, abilities, personality and home background, language competence, motivation, expectations towards achievement, preferred ways of learning, willingness to engage in collaboration, and current levels of understanding (Biggs, 1989; Freeth & Reeves, 2004). Students also approach learning differently. According to Biggs (1989), student *process* factors influence whether they take a surface or deep approach to learning. In the context of a simulation, for example, students might have quite different levels of knowledge and understanding of the concepts that underlie the game and international students may struggle with language and terminology. Other students may have less prior training or skill in the financial and numerical concepts that could help them interpret results (see for example Brennan & Vos, 2013). And, all of these factors could also affect collaboration and group work. As Freeth and Reeves (2004) note:

*‘to share effectively learners need some knowledge and skills to bring to the collaborative effort. This can inhibit the involvement of [some] students who may not yet feel much confidence in their grasp of [the] knowledge base (p. 49)’.*

Tutors have limited control over differences in student characteristics – particularly those related to differences in motivation, engagement and skill levels – as the decisions on student intake represents are an institutional factor (Astin, 1996). Perhaps tutors may underestimate the impact that such diversity may have on group functioning in particular. Which student related factors have the greatest impact on engagement and performance with authentic tasks such as simulations would be a useful direction for future research. The fact that many students struggle with particular aspects of the simulation and assessment should not, however, obscure the considerable benefits that simulations provide and that authentic pedagogies bring to student learning and development.

## 6. Conclusions

This study has attempted to fill some gaps in the literature with respect to how tutors assess student learning from simulations and what are the often encountered student weaknesses in assessment performance. Furthermore the study attempted to investigate whether simulation tutors tended to employ authentic assessment principles in designing their simulation assessment and teaching. Simulations – themselves and when structured by tutors – appear to be good examples of authentic pedagogic practices and these practices can allow for the development of more and higher levels skills, knowledge and understanding than traditional approaches. While many, although not all, proponents of authentic assessment claim that it can lead to improved learning (McAlister, 2000), this study has shown that student factors such as low motivation to engage and prior skill weaknesses can undermine the ability of authentic assessment regimes to achieve the purported learning benefits.

The study is limited by the small convenience sample of 35 surveys and eight interviews. Future research with a broader cross-section of simulation users from both business-related and other disciplines could provide greater insights into the relationship between weaker performance and student characteristics as well as that between teaching strategies and student performance. Prior studies have considered how the tutor’s actions and behaviour can impact student engagement and success with simulations (Hofstede et al., 2010; Pearson & Smith, 1986; Taylor et al., 2012; Wolfe, 1997) so additional research into the simulation tutor’s role could also add to our understanding of factors that affect the outcomes of authentic assessment. In addition, more research is needed into how tutors can best present or prepare students for some of the activities called for in authentic assessment, such as using higher level thinking skills, learning from feedback, engaging in reflection, and working more effectively in groups.

For tutors who are planning to use active learning techniques such as simulations as a means to develop work related competencies, this paper has provided some guidelines for how to structure and enhance the teaching and assessment. If the goal of assessment is to promote and enhance learning, as well as to develop future work and learning competencies, then authentic assessment does appear to offer ideas and practices to help students move towards these outcomes. While challenges remain in terms of student inputs, institutional constraints affecting assessment and potentially tutor actions, there are clear benefits to structuring assessment such that students can develop higher level skills, have many opportunities to practice, get a lot of feedback, and have a number of ways to demonstrate their learning and competence.

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