

Evaluating Student Learning Gain: A Case Study Based Upon Group-Work

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Abstract: The Higher Education sector faces an on-going process of marketisation in which the performativity agenda demands reporting against a wide range of metrics to satisfy the requests of the student consumer. Student learning gain is thought to be one way to generate module or course data that can be used to indicate value for money obtained from studying any particular university education. Furthermore, such data can be used to improve the effectiveness of teaching delivered by making changes in response to the student feedback received. This study applies a model for evaluating learning gain to students studying a business simulation module based upon group-work. The model is found to provide useful insights into how the students perceive their own learning and has revealed important gender differences in the learning being reported.

Keywords: marketisation; student learning gain; higher education; continuous improvement; distance travelled; journey travelled

Introduction

In the context of the ongoing marketisation of Higher Education, this paper considers what can be learnt from evaluating student learning gain, and specifically, what can be discovered when such an evaluation is applied in the context of group-based activities.

For students to experience group-work is an important element of university teaching. Working with other people is key to career success, and increasingly experience in group-work, and the associated communication skills, are sought after by employers. According to the World Economic Forum (2016), the ability to ‘co-ordinate with others’ is the fifth most important skill in their top ten listing that employers are looking for, now in this, the fourth industrial revolution. Looking ahead to the year 2025, the World Economic Forum (2020, p. 36) predicts that the most important skills for employers will evolve, but the list still includes

elements of group-work, such as leadership and social influence (ranked fifth), emotional intelligence (ranked eleventh) and persuasion and negotiation (ranked fifteenth).

Within a job interview setting, graduates can expect to be asked for examples of their experience of working in groups or teams, to demonstrate an understanding of how they need to behave when operating in a group setting, and to reflect on their own contribution to the group's outputs and outcomes. Furthermore, graduates are expected to evidence the resolution of conflicts and difficulties that may arise within group settings. Group-work therefore links to personal regulation such as self-awareness and self-management, and to recognition, including personal competence and social competence. Furthermore, there is a need for graduates working within teams to develop their emotional intelligence (Devis-Rozental & Farquharson, 2020; Peterson, 2021).

As reported by Berku (2021) and also by Močinić, Tatković and Tatković (2020), Kolb recognised the four key stages of learning through experience, these being: the experience itself; observation in terms of reflecting on what has happened; conceptualisation to make sense of what has been observed; and then experimentation to change things to achieve more successful results when similar situations occur in the future. But more than this, there remains a need to communicate clearly and in a timely manner, develop relationships which are akin to Wenger's Communities of Practice (1998), organise and schedule activities (and documentation) to ensure that the flow of deliverables is optimised, and sharing the workload in an equal and equitable manner which takes into account skills, priorities, and other demands on the time of the individuals involved.

Belbin (2011), and more recently Berku (2021), also propose that group and team-based activities consist of different roles, with each of these roles working independently. Examples include thought orientated roles such as Monitor / Evaluator or Specialist; action orientated roles such as Plant, Shaper, Implementer or Completer / Finisher; and people

orientated roles comprising Co-ordinator, Team Worker and Resource Investigator. Not all group or team activities will have, or need, all of these roles fulfilled, and sometimes an individual will take on more than one role at different points during the activity.

Taking this into account, the learning that students' experience when undertaking group-based activities has increasing importance to their future employability, and therefore for them to be able to unpack their individual learning journey in terms of a particular student's learning gain, or that of a cohort of students, now has increased added value.

Learning Gain

Neoliberal thinking would lead us to the conclusion that the Higher Education sector should be a competitive market, with indicators for how the various organisations within it are performing (Howson & Buckley, 2020). Certainly, the international appetite for finding a suitable mechanism and metric for determining the 'value for money' from a Higher Education degree is gaining traction (Polkinghorne, Roushan & Taylor, 2017a; Evans, Howson & Forsythe, 2018), but any such thinking needs to be undertaken in the context of the three domains of educational purpose (Gossman, Powell & Neame, 2018, Biesta, 2010), these being that education is about gaining qualifications, that education is also about the improvement in levels of socialisation, and finally that education is about the understanding of subjectification (uniqueness of the individual).

Howson and Buckley (2020) have identified that in some circumstances, student outcomes are being used as a construct to indicate value for money which may not be appropriate as they may not be meaningful measures. However, students gain much more when studying in Higher Education than just the qualification obtained (Speight, Crawford & Haddelsey, 2018; Johnson, 2021), and both value for money, and learning gain, need to be considered differently from other enhancements related to study in Higher Education such as

‘content knowledge, employability, earnings, or degree outcomes’ (Vermunt, Ilie & Vignoles, 2018, p. 293).

A detailed review of learning gain has previously been undertaken by Tight (2021), and there is consensus that universities across the globe are currently struggling to define metrics for measuring learning gain which can offer any level of meaningful data (Wells, 2018; Sands, Parker, Hedgeland, Jordan & Galloway, 2018), and that are relevant to the Higher Education context (Vermunt *et al.*, 2018). With respect to the measurement of student learning gain, Boud (2018) argues that we cannot use student outcomes (assessments) for this purpose as the aggregation of various learning outcomes into a final mark makes this impractical. This view is supported by the independent work of McGrath, Guerin, Harte, Frearson and Manville (2015) which argues that the final mark (grade) is about the level achieved by a student, whereas learning gain is concerning the change that has occurred in a student’s level of knowledge and understanding.

In the US, the definition of learning gain, and the evaluation approach taken to assess it, can be determined by the individual university itself (Andrade, 2018). The same approach applies in the UK. This is just one of the significant barriers that prevents a sensible comparison of learning gain assessments between Higher Education institutions from being effective (Arico, Gillespie, Lancaster, Ward, & Ylonen, 2018) as the resulting data will often have been formed differently. Another barrier is that disciplinary approaches may vary even within a single institution.

Benchmarking students at the start of the year, and again at the end of the year, to compare any differences, may provide an indication of learning gain, yet delivery of such a test twice a year has administrative and financial consequences which need to be considered carefully (Aloisi & Callaghan 2018; Baume 2018). A further barrier that prevents a sensible comparison of learning gain assessments between Higher Education institutions from being

effective is the variation in the time interval between testing students over which such a comparison is made. Such time intervals can vary greatly, with some reaching from the start to end of the whole degree course, and others being much shorter and more focussed periods. In fact, research by Aynsley, Nathawat & Crawford (2018) revealed learning gain improvements in the form of knowledge retention being reported from as a little as 3 days of study.

Furthermore, the relation between learning gain and entry qualifications may prove to be an important indicator of learning achieved (Baume, 2018), and might be much more relevant than the relationship between learning gain and exit performances, for which there are concerns that ‘in both the US and the UK, the grades gained by students in Higher Education have increased over time’ (York, 2012, p. 38). More than this, learning gain can be about the ‘value added’ (Cameron, Wharton & Scally, 2018), i.e., the difference between the grade that a student is predicted to achieve compared to the grade which the student actually achieves. Assessment of this aspect of a student’s development is clearly problematic, and often quite highly subjective in terms of the mechanism for making any such predictions. However, it is recognised that a student’s learning trajectory can certainly be improved through the provision of appropriate support structures (Rogaten & Rienties, 2018). Further research by these scholars (p. 162) determined that ‘socio-demographic variables, i.e., gender, ethnicity, social economic status (SES), and prior educational qualifications, play an important role in predicting students’ attainments, especially in distance learning settings’. What is therefore clear, is that there is a suggestion that whilst there may be measurable benefits from a university education for all students, the impact of this will vary, and may be greater for what may be considered to be ‘historically underrepresented or underachieving groups of students’ (Parker, 2018, p. 145).

Forsythe and Jellicoe (2018) argue that the evaluation of a student's progress as a whole, and the noting of any changes that occur in their understanding, is a more appropriate gauge of their educational development than just considering the grades that they have been awarded. Of particular note, they consider that students can self-report these changes. However, there is also increasingly a concerning focus upon the 'quantity' of student learning, opposed to the value of the learning (Howson & Buckley, 2002) and we therefore need to be careful about what we are assessing.

The work by Scalise, Douskey and Stacy concludes that a Higher Education specific focus 'may offer some new approaches [for] considering both student learning gain and the efficacy of new interventions' (2018, p. 193). It is clear that we therefore need a variety of approaches to understand the learning experience of students. However, once we have this understanding, we can, and should, use this new knowledge as the basis from which we can improve the teaching that we deliver (Lowe, Sims & Winter, 2019), i.e. if our goal is to achieve improved student learning, then surely the mechanisms to do this are to control entry standards at an appropriate level, and then to deliver improved standards of teaching thereafter. Improving teaching therefore needs to be the goal of any assessment of learning gain being undertaken (Andrade, 2018).

Just considering learning may not be enough on its own. The theoretical (explicit) knowledge gained by students within their university studies needs to find practical context (Evans, Guile, Harris & Allan, 2010, Morley, Bettles & Derham, 2019), and there is a requirement for students to 'engage in a dialogue around their growing knowledge, skills and experience' (Turner, Sutton, Muneer, Gray, Schaefer & Swain, 2018, p. 243) which undertaking work in a group based setting will help to support. This argument presents the opportunity for learning gain assessments to consider both explicit, and also experience (tacit) knowledge elements in the form of a student's own perceptions of the distance

travelled and learning journey that they have experienced (Neves & Stoakes, 2018).

Furthermore, assessing the learning gain of a student may provide some indication of their academic self-efficacy (Pampaka, Swain, Jones, Williams, Edwards, & Wo, 2018, p. 140).

Taking these factors into account, this paper investigates the application of one of the models for evaluating student learning gain, to consider the lessons that can be extracted. In particular, the model is applied to group-work activities undertaken by students to explore how their learning differs based upon variations in gender and knowledge areas.

Research Approach and Method

The research reported upon within this paper, is the application of a model for evaluating the learning gain of undergraduate students which was first presented in 2017 at a Higher Education Academy conference in the UK (Polkinghorne, Roushan & Taylor, 2017b). Since then, the model has been successfully applied to a small group of final year (level 6) project students undertaking largely autonomous study (Polkinghorne, Roushan & Taylor, 2021), and it has also been applied in longitudinal research study which concluded that changes to teaching based upon the model's reporting from one year, could then be used to enhance teaching to the next cohort of marketing students during the subsequent year (Polkinghorne, O'Sullivan, Taylor & Roushan, 2019). This paper reports on a new study, and provides an important different lens, as it seeks to determine the applicability of the model for group-work based teaching, using a cohort of undergraduate business studies students undertaking a second year (level 5) *Business Simulation* module. This paper is reporting on research undertaken during the period 2016 to 2020 and uses a sample of 70 undergraduate students which includes 40 Females and 30 Males.

Secondary data collection

Secondary research was undertaken to support this study. Public domain and Government publications were reviewed. Priority was applied to publications in the period since 2015. The database archives utilised included Academic Search Complete, Education Source, Scopus, Directory of Open Access Journals, Science Direct, and Web of Science.

Primary data collection

Skewed Likert style questions (Likert 1932) were developed as the data gathering mechanism for the ordinal (ranked) data being collected. The self-reported reflective questions were delivered using the secure JISC Online Surveys digital platform. A cross-sectional time horizon has been applied when assembling responses from participants at the end of their studies on the *Business Simulation* module. The approach taken has been inductive, with a qualitative mono-method (Saunders, Lewis & Thornhill, 2019), to enable the development of an understanding regarding how the model for evaluating student learning can be applied to group-work based university undergraduate modules based upon the thoughts and views of participants.

The Polkinghorne *et al.* (2017b) model for evaluating the learning gain of undergraduate students divides questions asked into two distinct groupings, these being 1) *Distance Travelled*, i.e. explicit knowledge gained that can be codified and verbalised, and 2) *Journey Travelled*, i.e. tacit knowledge gained in the form of practical know-how and experience. The *Learning Gain* questions created, as defined in Table 1, were based upon the learning outcomes for the *Business Simulation* module being taught. The module was designed to support students to develop:

1. A critical understanding of the range of (graduate) recruitment techniques and devices available to employers;

2. The ability to prepare, organise, implement, and critically evaluate the effectiveness of techniques and tools for assessing potential performance and ‘talent’;
3. An understanding of the importance of professional conduct in a business environment and appreciation of the complexities and interrelatedness of business and management functions;
4. The ability to apply to the coursework set knowledge and skills acquired from a broad range of units to a business situation;
5. An understanding of self, others, team/group dynamics and the issues involved in being effective in team-based and activity-based contexts.

Students were asked to reflect on their own personal learning from studying the *Business Simulation* module. The descriptive linguistic label options for the ranking scale question responses (and codes) were *Exceptional Improvement* (4), *Significant Improvement* (3), *Moderate Improvement* (2), *Minor Improvement* (1) and *No Change* (0).

Questions Relating to Distance Travelled	Question 1	How much has your understanding of the inter-relatedness of business and management functions increased?
	Question 2	How much has your understanding of the importance of professional conduct increased?
	Question 3	How much has your understanding of group dynamics and the related issues increased??
	Question 4	How much has your understanding of how to apply recruitment techniques increased?
Questions Relating to Journey Travelled	Question 5	How much has your ability to undertake group-based activities improved?
	Question 6	How much has your ability to assess potential performance and talent improved?
	Question 7	How much have your skills for running a recruitment assessment centre improved?
	Question 8	How much has your ability to apply knowledge and skills to a business situation improved?

Table 1. Learning gain questions for both *distance travelled* and *journey travelled*

Sampling followed a self-selection purposive strategy, from a heterogeneous population for which the overriding defining characteristic was Gender. The importance of Gender in group-work has previously been established in the work by Curseu and Pluut (2013). Pre-processing of the data was undertaken to remove incomplete submissions, students from other courses not being considered, and international students on exchange visits for only a short period of time.

In a small number of cases, a few clear outliers were identifiable within the data, in which the students concerned did not appear to have taken the exercise seriously. Such extreme cases (both high and low) were ignored for the purposes of this study to avoid skewing the results.

Consideration of the data was undertaken through a variety of different lenses, including analysis by *Question, Student, Gender, and Distance Travelled / Journey Travelled*. In each case, frequency data was used to determine the learning gain being reported, with the combined percentage of responses from students reporting *Exceptional Improvement* or *Significant Improvement* categories being used to indicate acceptable levels of learning had been achieved.

To ensure that data collected was meaningful, internal reliability was considered, and a face validity test was undertaken to confirm that there was no obvious ambiguity or overlap, within the questions being asked (Saunders *et al.*, 2019). Ethical approval for this study was approved by Bournemouth University (Reference 13829). Since students are considered to be vulnerable adults, due to the potential influence of the staff-student relationship, ethical restrictions included voluntary / anonymous participation, and the delayed analysis of data until after the publication of student results.

Data Collection and Analysis Using the Evaluation Model

Analysis of the Data by Question

Consideration of the data collected, in the form of a frequency analysis, indicated how many students reported that they perceived their learning against each question asked to fall within either *Exceptional Improvement* or *Significant Improvement* categories. For this study, this is considered to be the *Learning Gain* and it is expressed as a percentage. Before undertaking this study, it was the expectation of the research team that the *Learning Gain* being reported for each question should exceed 50%.

The *Learning Gain* reported for Question 1 (*How much has your understanding of the inter-relatedness of business and management functions increased?*) was only 20% (i.e., only 20% of participating students indicated that they perceived their learning for Question 1 to fall into the *Exceptional Improvement* or *Significant Improvement* categories) which falls far below expectations, and is therefore particularly low, and of significant concern. This aspect of the teaching requires urgent investigation and consideration.

Of the *Learning Gains* being reported for the remaining questions, Question 2 (*How much has your ability to undertake group-based activities improved?*), Question 3 (*How much has your understanding of the importance of professional conduct increased?*), Question 4 (*How much has your ability to assess potential performance and talent improved?*) and Question 8 (*How much has your ability to apply knowledge and skills to a business situation improved?*) all also fell below the 50% expectation threshold with *Learning Gains* of 35.5%, 45.7%, 41.4% and 47.1% respectively. All of these aspects of the Teaching require monitoring and enhancement.

Conversely, Question 5 (*How much has your understanding of group dynamics and the related issues increased?*) and Question 7 (*How much has your understanding of how to*

apply recruitment techniques increased?) reported much higher Learning Gains exceeding the expectation threshold of 52.9% and 58.6% respectively. Furthermore, in the case of Question 6 (*How much have your skills for running a recruitment assessment centre improved?*), the reported *Learning Gain* was an exceptional 72.9%. This is an indicator of a highly successful student learning experience from the students' own perspective. Best practice from this teaching should be understood, disseminated, and replicated across the teaching on the rest of the module.

Q1	20.0%
Q2	35.7%
Q3	45.7%
Q4	41.4%
Q5	52.9%
Q6	72.9%
Q7	58.6%
Q8	47.1%

Table 1. Reported *Learning Gain* for Questions 1 to 8

The overall reported *Learning Gain* calculated as being the mean of the Learning Gain responses is 46.8%. Furthermore, aggregating together the *Learning Gain* responses Questions, 1, 3, 5 and 7 reveals an overall indication of the perceived *Distance Travelled* achieved, which is reported as being 44.3% which falls below the expectation threshold of 50%. Aggregating together the *Learning Gain* responses for Questions, 2, 4, 6 and 8 reveals an overall indication of the perceived *Journey Travelled* achieved, which is reported as being 49.3% which once again falls below the expectation threshold of 50%. The data therefore indicates that overall, the students are reporting higher levels of *Journey Travelled* compared to *Distance Travelled*. Although the difference cannot be considered to be significant, this result indicates that the participating students as a group, are reporting more improvements in their practical skills compared to their theoretical understanding.

Analysis of the Data by Gender

The *Learning Gain* data reported for each question, and by each student, are detailed in Table 2 for Female responses, and in Table 3 for Male responses. Considering firstly the Female responses, in terms of validity, a wide range of responses have been collected, with some students (for example students F1, F2 and F3) reporting largely very negative responses of *No Change* (0) and *Minor Improvement* (1), interspersed with the occasional *Moderate Improvement* (2) and even *Significant Improvement* (3). Other Female students (for example students F38, F39 and F40) reported largely very positive responses of *Significant Improvement* (3) and *Exceptional Improvement* (4), interspersed with the occasional *Moderate Improvement* (2) and even *Minor Improvement* (1).

Considering the Male responses, a similar wide range of responses have been collected, with some students (for example students M1, M2 and M3) reporting largely very negative responses of *No Change* (0) and *Minor Improvement* (1), interspersed with the occasional *Moderate Improvement* (2) and even *Significant Improvement* (3). As with the Female students, other Male students (for example students M27, M28, and M29) reported largely very positive responses of *Significant Improvement* (3) and *Exceptional Improvement* (4), interspersed with the occasional *Moderate Improvement* (2). Of note is the case of student M3, who alongside a series of negative *No Change* (0) and *Minor Improvement* (1) responses, included both a *Significant Improvement* (3) for Question 8 (How much has your ability to apply knowledge and skills to a business situation improved?) and also an *Exceptional Improvement* (4) for Question 6 (How much have your skills for running a recruitment assessment centre improved?). Both Question 6, and Question 8, relate to *Journey Travelled* and so are skills-based questions.

Looking holistically at the data collected, these variations in the responses of individual students, reinforce the expectation that the students have taken the data collection

exercise seriously, and have provided thoughtful responses that actually reflect their own perceptions regarding the learning opportunity presented to them.

If we now consider the combined *Learning Gain* data for *Distance Travelled* (Questions 1, 3, 5 and 7) and *Journey Travelled* (Questions 2, 4, 6 and 8) for Female students (Table 4), the students reporting the highest *Learning Gain* (students F3, F38, F39 and F40) are consistently reporting lower *Distance Travelled* compared to *Journey Travelled*. This data is in the context of the overall *Learning Gain* reported by Females (48.8%) being comprised of a *Distance Travelled Learning Gain* of 45.6% and an above expectation threshold *Journey Travelled Learning Gain* of 51.9% (Table 6).

Considering the combined data for *Distance Travelled* (Questions 1, 3, 5 and 7) and *Journey Travelled* (Questions 2, 4, 6 and 8) for Male students (Table 5), the pattern identified in the Female responses is not replicated. This data is in the context of the overall *Learning Gain* reported by Males (44.2%) being comprised of a *Distance Travelled Learning Gain* of 42.5% and a *Journey Travelled Learning Gain* of 45.8% (Table 6). In both the case of *Distance Travelled*, and *Journey Travelled*, overall *Learning Gain* reported by Males was lower than those reported by Females.

Females

Student	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
F1	0	2	0	3	1	0	2	1
F2	1	1	1	2	2	3	0	0
F3	1	0	1	2	3	1	1	1
F4	1	1	2	2	1	2	1	1
F5	0	2	0	2	2	2	1	2
F6	2	2	1	1	1	2	1	2
F7	0	1	3	2	1	2	2	2
F8	1	2	1	2	2	2	2	1
F9	1	0	3	2	1	2	3	3
F10	1	2	2	2	3	2	1	2
F11	1	2	1	2	3	3	2	1
F12	1	2	3	1	3	4	3	0
F13	1	1	2	3	1	4	3	2
F14	2	2	2	1	1	3	3	3
F15	1	3	2	3	3	2	2	2
F16	3	2	3	3	2	3	1	2
F17	2	2	2	3	3	3	2	2
F18	2	1	2	3	2	3	4	2
F19	2	3	2	2	3	3	2	3
F20	2	2	4	1	2	4	3	2
F21	2	2	3	3	2	3	2	3
F22	1	3	2	3	2	4	3	3
F23	2	1	3	3	2	4	3	3
F24	2	2	3	2	3	3	3	3
F25	3	2	2	2	1	4	4	3
F26	2	2	3	3	3	3	3	3
F27	2	3	3	2	3	3	3	3
F28	3	2	3	3	2	3	3	3
F29	3	2	2	3	3	3	3	3
F30	2	3	3	3	3	3	3	2
F31	2	3	3	3	2	3	4	3
F32	3	4	2	3	3	4	3	1
F33	2	3	2	2	3	4	4	3
F34	3	3	3	3	4	2	3	3
F35	3	2	3	1	4	4	4	3
F36	2	3	3	4	3	3	3	4
F37	1	4	3	3	4	4	3	3
F38	3	4	4	4	4	2	2	3
F39	1	3	4	3	3	4	4	4
F40	2	4	4	4	3	4	3	2

Table 2. Data sorted by code - Females

Males

Student	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
M1	1	0	1	2	1	2	1	0
M2	1	2	0	0	1	1	1	2
M3	1	0	0	2	0	4	0	3
M4	2	1	2	1	0	2	2	1
M5	1	1	0	2	2	2	2	2
M6	2	1	1	1	1	3	2	1
M7	0	2	1	2	3	3	2	2
M8	2	2	0	1	2	3	3	2
M9	1	3	1	0	3	4	3	2
M10	0	2	2	1	3	4	3	2
M11	2	3	1	1	2	3	3	2
M12	2	3	2	2	2	3	2	2
M13	3	2	2	2	3	3	1	2
M14	2	2	2	3	1	3	3	2
M15	1	3	2	2	3	3	3	2
M16	0	2	4	3	1	4	3	2
M17	3	3	2	1	2	2	3	3
M18	3	1	2	2	3	4	3	2
M19	2	2	2	2	3	3	3	3
M20	2	3	3	0	4	4	1	3
M21	2	3	4	3	2	2	2	3
M22	2	4	3	2	3	3	1	3
M23	2	2	3	1	3	4	3	3
M24	2	3	4	2	3	2	3	2
M25	2	2	3	2	3	4	3	3
M26	2	2	3	3	2	4	3	3
M27	3	2	4	3	4	4	2	3
M28	3	2	4	4	3	4	3	3
M29	2	3	3	3	4	4	4	3
M30	4	3	4	3	4	4	4	3

Table 3. Data sorted by code - Males

FEMALES

Student	Distance Travelled	Journey Travelled	Overall
F1	0.0%	0.0%	0.0%
F2	0.0%	0.0%	0.0%
F3	0.0%	0.0%	0.0%
F4	0.0%	0.0%	0.0%
F5	0.0%	25.0%	12.5%
F6	0.0%	25.0%	12.5%
F7	25.0%	0.0%	12.5%
F8	25.0%	0.0%	12.5%
F9	25.0%	0.0%	12.5%
F10	25.0%	25.0%	25.0%
F11	50.0%	25.0%	37.5%
F12	25.0%	50.0%	37.5%
F13	25.0%	50.0%	37.5%
F14	25.0%	50.0%	37.5%
F15	25.0%	50.0%	37.5%
F16	25.0%	50.0%	37.5%
F17	50.0%	25.0%	37.5%
F18	75.0%	25.0%	50.0%
F19	50.0%	50.0%	50.0%
F20	25.0%	75.0%	50.0%
F21	25.0%	75.0%	50.0%
F22	50.0%	50.0%	50.0%
F23	25.0%	100.0%	62.5%
F24	50.0%	75.0%	62.5%
F25	75.0%	50.0%	62.5%
F26	50.0%	75.0%	62.5%
F27	75.0%	75.0%	75.0%
F28	75.0%	75.0%	75.0%
F29	75.0%	75.0%	75.0%
F30	75.0%	75.0%	75.0%
F31	75.0%	75.0%	75.0%
F32	50.0%	100.0%	75.0%
F33	75.0%	75.0%	75.0%
F34	100.0%	50.0%	75.0%
F35	75.0%	75.0%	75.0%
F36	75.0%	75.0%	75.0%
F37	100.0%	75.0%	87.5%
F38	75.0%	100.0%	87.5%
F39	75.0%	100.0%	87.5%
F40	75.0%	100.0%	87.5%

Table 4. Sorted aggregated *Learning Gain* for *Distance Travelled* and *Journey Travelled* - Females

MALES

Student	Distance Travelled	Journey Travelled	Overall
M1	0.0%	0.0%	0.0%
M2	0.0%	0.0%	0.0%
M3	0.0%	0.0%	0.0%
M4	0.0%	0.0%	0.0%
M5	0.0%	25.0%	12.5%
M6	0.0%	50.0%	25.0%
M7	25.0%	25.0%	25.0%
M8	25.0%	25.0%	25.0%
M9	0.0%	50.0%	25.0%
M10	25.0%	50.0%	37.5%
M11	50.0%	25.0%	37.5%
M12	50.0%	25.0%	37.5%
M13	25.0%	50.0%	37.5%
M14	50.0%	50.0%	50.0%
M15	50.0%	50.0%	50.0%
M16	50.0%	50.0%	50.0%
M17	50.0%	50.0%	50.0%
M18	75.0%	25.0%	50.0%
M19	50.0%	50.0%	50.0%
M20	25.0%	75.0%	50.0%
M21	75.0%	25.0%	50.0%
M22	50.0%	75.0%	62.5%
M23	50.0%	75.0%	62.5%
M24	75.0%	50.0%	62.5%
M25	75.0%	50.0%	62.5%
M26	50.0%	75.0%	62.5%
M27	75.0%	75.0%	75.0%
M28	100.0%	75.0%	87.5%
M29	75.0%	100.0%	87.5%
M30	100.0%	100.0%	100.0%

Table 5. Sorted aggregated *Learning Gain* for *Distance Travelled* and *Journey Travelled* - Males

Considering the aggregated *Learning Gain* reported for each question (Table 6), both Females and Males have reported the lowest learning (20.0% for both Females and Males) for Question 1 (*How much has your understanding of the inter-relatedness of business and management functions increased?*) which falls far below the expectation threshold. As previously discussed, this indicates the need for remedial action to ensure that the teaching is delivered more

effectively. For the majority of questions (Questions 3, 4, 5, 7 and 8), the *Learning Gain* reported for Females were consistently higher than those reported by Males which interestingly links to previous work by Quaye *et al.* (2019). However, there are two highlights of interest:

1. The case of Question 6 (*How much have your skills for running a recruitment assessment centre improved?*) which is the highest aggregated *Learning Gain* reported (72.9%), indicates that there has been effective learning reported for both Females (70.0%) and for Males (76.7%). In contrast to most other data collected, Males are reporting higher learning than Females for this question.
2. The case of Question 4 (*How much has your ability to assess potential performance and talent improved?*) which has the largest difference in *Learning Gain* reported between Females (52.5%) and Males (26.7%) against an aggregated *Learning Gain* for this question of 25.8%. Why there is such a significant gender divide based upon the learning needs to be investigated further to ensure that this is properly understood.

Gender	Distance Travelled				Journey Travelled				Overall Learning Gain
	Q1	Q3	Q5	Q7	Q2	Q4	Q6	Q8	
Female	20.0%	50.0%	52.5%	60.0%	35.0%	52.5%	70.0%	50.0%	48.8%
Aggregated	45.6%				51.9%				
Male	20.0%	40.0%	53.3%	56.7%	36.7%	26.7%	76.7%	43.3%	44.2%
Aggregated	42.5%				45.8%				

Table 6. Variations in student *Learning Gain* reported by gender

Conclusions

The model utilised by this research study was first proposed by Polkinghorne *et al.* in 2017 and has previously been applied to a largely autonomous project-based module (Polkinghorne *et al.*, 2021) and to individually based taught marketing modules (Polkinghorne *et al.*, 2019).

The study reported upon in this paper is the first application of the model with a focus upon group-work based activities. How the model would respond to student responses was unknown as the group-work element was an untested dimension not previously considered.

The module used for this study was *Business Simulation* in which the students had to work in teams, and use an assessment centre approach, to undertake pseudo company related activities connected with the recruitment and selection of new staff.

The model was applied and data collected from 70 student volunteers. Responses from each student were coded and compared to identify patterns and trends in the data. Clear similarities and differences became apparent between the data responses for different questions, and also in relation to gender.

Overall, the model successfully identified that students participating in this study reported higher levels of *Journey Travelled* learning compared to *Distance Travelled* learning which indicates more enhancement to their practical skills compared to their theoretical knowledge. This finding underpins the overall direction of the intended module learning.

The question relating to the inter-relatedness of business and management functions (Question 1) unexpectedly highlighted that all of the students perceived that their learning was low for this topic. It is therefore recommended that the academic team consider undertaking remedial action to understand and rectify this issue as soon as possible.

The learning reported by Females in relation to skills for assessing potential performance and talent (Question 4) vastly exceeded that of the Males. Understanding why this significant difference between the learning of the two genders has occurred, possibly using a semi-structured interview approach, is recommended so that the limited learning reported by the Males can be addressed, and the gender gap identified can be reduced to an acceptable level.

Conversely, the very high levels of learning reported by the Males in relation to skills for running a recruitment assessment centre needs further investigation, to appreciate what has occurred, and why in this topic area, the pattern of the learning being reported by the

Males has worked so well, so that any best practice can be identified and disseminated as appropriate.

Furthermore, when considering the results as a whole, they are disappointing, with most data collected failing to exceed, or even match, the expectation threshold which was set at being 50%. The expectation threshold in this context indicates the number of students in the cohort who perceived that their learning could be represented by the linguistic terms *Significant Improvement* or *Exceptional Improvement*. This result was unexpected and suggests that whilst students undertaking group-work may benefit from the development of important transferable skills such as communication and planning, they may also feel that their actual subject level learning may suffer as a result. It is therefore the recommendation of this research that the introduction of group-work within university settings should not be overused to ensure that an appropriate balance of learning opportunities can be presented to students. However, it should be remembered that this is the first study of its kind to apply the model for evaluating student Learning Gain to group-work based teaching, and therefore perhaps an expectation threshold of 50%, which is appropriate for teaching modules with individual assignments, is less appropriate in the case of group-work teaching. Furthermore, the expectation threshold was set to include only responses reporting *Significant Improvement* or *Exceptional Improvement* in student learning. Had *Moderate Improvement* been included as well, then the expectation threshold of 50% would have been exceeded, but then perhaps a higher expectation threshold would also have been required. This is an area of this research which requires further consideration to conclude at what level the expectation threshold should be set in future studies.

The concept of collecting data relating to a student's perceived *Learning Gain* has been demonstrated to offer valuable insights into their learning experience. This is a key and significant outcome, as using this model for evaluating student *Learning Gain* provides the

learner with the opportunity to reflect on their situation. This type and level of reflection is important as it helps the individual student to understand themselves, and this understanding of self will underpin and shape their future life-long learning, career development and employment progression.

In summary, application of the model has been successful in this group-work application, and a range of new insights have been provided which can be used to inform the annual continuous improvement process so that teaching effectiveness, or at least the perception of teaching effectiveness, can be improved over time. The authors predict that this approach to collecting student feedback, may offer a unique perspective, which Higher Education systems across the UK, and indeed across the globe, may find helpful to address the challenges of marketisation, and the ongoing reshaping of teaching practices driven by the need to respond to the consequences of the Covid-19 pandemic.

Limitations of the Research

Although the number of Female participants (40), outnumbered the Male participants (30), this did not skew the data analysis in terms of gender issues, but may have impacted upon the overall results.

This study considers a large cohort of 70 participants who are all from a Business Studies undergraduate degree programme. Data was collected relating to a Business Simulation module which is based around group-work. Consideration of different groups of students, from other disciplines, would provide a wider perspective to the operation of model for evaluating learning gain. Future research would be further enhanced by undertaking a longitudinal study in which data is collected in one year, changes are made to the teaching to address any issues raised in the data analysis, and then further data is collected the subsequent year to identify any resulting changes in learning being reported. Any such developments

could be used to inform the continuous improvement process undertaken in Higher Education organisations on an annual basis, and could even be expanded to consider diversity issues (Smith, 2020)

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