Martyn Polkinghorne, Gelareh Roushan & Julia Taylor (2020) Seeking an educational Utopia: an alternative model for evaluating student Learning Gain, Journal of Further and Higher Education, DOI: 10.1080/0309877X.2020.1826035

Seeking an Educational Utopia: An Alternative Model for Evaluating Student Learning Gain

Across the Higher Education sector there is growing interest regarding the 'value for money' of a university education, and in response to this, universities may need to consider how to evaluate the perceived learning of students alongside their actual learning. *Learning Gain* maybe helpful in this regard, but there is currently no agreed method for evaluating the *Learning Gain* achieved, or perceived, by any particular student. This paper discusses a new model that can be used for evaluating such student perceptions. The model itself considers both the *Distance Travelled* (explicit knowledge) and the *Journey Travelled* (tacit knowledge) reported by students. The model employs a self-certified reflective survey method. A study, using a cohort of final year undergraduate dissertation students is undertaken to evaluate the potential usefulness of this model. The primary results obtained from this study provide an interesting perspective on how students perceive their own learning, which in turn has implications for understanding how our own teaching is viewed by students. The outcome of this research is that further testing is recommended using a wider variety of courses, and larger cohorts of students.

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

Introduction

Learning Gain is a term used to indicate the change in a student's understanding as a result of studying a module or course. The Office for Students in England defines *Learning Gain* as being the measurement of "improvements in knowledge, skills, work-readiness and personal development made by students during their time in Higher Education" (https://www.officeforstudents.org.uk/advice-and-guidance/teaching/learning-gain/, September 20, 2019). Across the Higher Education sector, student progress can be tested using summative assessments in relation to the achievement of *Learning Outcomes* (McGrath *et al*., 2015). However, increasingly it is becoming important that we appreciate how students view their own learning as this is inextricably linked to wider 'value for money'

considerations. There is evidence that fewer students in England, as a few as 39%, consider that their Higher Education experience represents good value for money (Neves and Hewitt, 11), and therefore if we can understand how they perceive their own learning, we are better placed to ensure that the educational experience that they receive is both academically strong, and simultaneously respected by the students involved.

To further the debate concerning how this could be achieved in practice, this paper theorises that understanding how students perceive their own learning can be achieved by asking them to reflect on changes in their own learning stimulated by the teaching that they have received.

Learning Gain

Researchers have previously considered how we might use the *Learning Gain* of students as an indicator of teaching quality (McGrath *et al*., 2015; Polkinghorne and Roushan, 2017). Randles and Cotgrave report that the England based National Mixed Methods *Learning Gain* project has considered the development of 31,000 undergraduate university students per year as part of a longitudinal study, and in a different study, the Higher Education *Learning Gain* analysis programme has considered applying known techniques to large datasets (2017, 51).

Furthermore, in the US, *Learning Gain* methods utilised over recent years have been reviewed in the work of Arum and Roska (2011). Assessment instruments for measuring improvements in core skills have been reflected in the work by Liu (2011) which considered constructs that included critical thinking, reasoning and problem solving and used Collegiate Learning Assessment (CLA), Collegiate Assessment of Academic Proficiency (CAAP) and ETS Proficiency Profile (EPP) assessment methods. In a further EPP study reported by Roohr *et al*., (2017), university experience was found to be the largest significant predictor of

student *Learning Gain*, although the work undertaken by Banta and Pike (2012) argues that outcomes measured by these forms of test only represent a proportion of the learning that has actually occurred.

Research by Douglas *et al*., (2012) reports on methods using the Grade Point Average (GPA), i.e. the comparison between self-reported student results at two different points in time in a longitudinal study, and that students were able to accurately report the change in their own learning performance over time. Separate complementary studies by both Bowman (2010) and Porter (2012) discussed the validity of such methods due to the risk of potential over (or under) reporting by students resulting from human error. In particular, Porter questions the validity of self-reported learning gains as a means of determining learning. However, these factors also need to be balanced with the administrative effectiveness, and objective scoring, of such approaches (Randles and Cotgrave 2017). It is also important to recognise that actual learning, and perceived learning are not the same thing. Therefore, a measure which lacks reliability in terms of actual learning, may in fact be quite well suited to providing an indication of perceived learning.

The effect of peer instruction (Banta and Pike 2017), group size (Kooloos *et al*., 2011), gender/ethnicity (Willoughby and Metz 2009) and socio-economic status (Jones *et al*., 2017) are all considered to play a part in the *Learning Gain* of students and there is evidence in these previous studies to indicate that this is the case. There is also scope for considering the use of pre-instructional knowledge which is believed to have a significant influencing effect on *Learning Gain* (Capizzo *et al*., 2006), as does the subject matter being studied (Boothe *et al*., 2018).

Ultimately, the goal of evaluating either the actual, or the perceived, *Learning Gain* of students is to underpin the continuous improvement process of teaching with an understanding of the effectiveness of current methods through the lens of the student, so that the learning experience of the students can be enhanced over time (Cahill *et al*., 2010).

It has been suggested that good teaching practices should be found within a learning environment that encourages the development of independent research and study, with leadership that promotes and recognises excellent teaching and learning, acknowledging the relationship between teaching, scholarship and research. The resulting student outcomes and *Learning Gain* should capture the educational and employment benefits of Higher Education including knowledge, skills and career readiness, professional development and added value. Together, these factors represent knowledge and skills that are both desired, and sought after, by employers (Department for Business, Innovation and Skills, 2015). It should be noted that "teaching and learning" in the context of this paper follows the common usage (www.advance-he.ac.uk/guidance/teaching-and-learning, August 03, 2020) that learning follows teaching, and that the two are most often inextricably linked.

Whilst how *Learning Gain* will be measured is yet to be decided, Polkinghorne *et al*., (2017a) have identified 10 key characteristics that should be considered after reviewing sixty of the consultation responses to the original *Higher Education Green Paper* submitted by a range of representative stakeholders in Higher Education. They have taken this work even further by then considering the role of *Learning Gain* as an indicator of teaching quality. This new understanding provides an opportunity to develop a model for assessing *Learning Gain*. Additional work by Macfarlene (2016) considers the effect on assessment of observable

student attitudes and behaviours, such as class attendance and participation, which could form further key dimensions for advancing debate on this important topic.

Teaching on courses and modules across Higher Education is, without question, an integral part of the university educational process, and the quality of the teaching provided is directly linked to the perceived value for money of a course (Cameron *et al*., 2018; Evans *et al.*, 2018; Liu *et al*., 2016; Wood and Su, 2017). However, to understand the role teaching must play, it is a pre-requisite that we firstly understand the fundamental purpose of Higher Education (Brew 2007; Skelton 2005).

The National Committee of Inquiry into Higher Education acknowledged that there is considered to be a direct connection between economic success at a national level, and the learning provided by Higher Education (Dearing, 1997). From this perspective, contextual factors can be considered such as the economic return to a country from Higher Education (*Managerialism*), the competition between universities (*Market*) and the need for universities to respond to targets and indicators (*Performativity*).

Furthermore, Skelton argues that there is a *Dominant Conceptualisation* for Higher Education**,** which considers the need to produce trained and qualified people who have a wider range of life choices as a result, and also an *Alternative Conceptualisation* which is focussed upon developing a student's autonomy through the formulation of intellect, character and an understanding of society. As educators we have therefore to consider if the teaching that we are providing is primarily to create a skilled workforce to satisfy the needs of business and industry, or to develop individual students capable of contributing to intellectual debate regarding the issues of our times. Whilst these two conceptualisations are not necessarily mutually exclusive,

if we, as educators, can understand which of these is our primary focus, then we are better placed to deliver more effective teaching. As a result, we will be able objectively to evaluate our own teaching to ensure that the education that we deliver is 'fit for purpose' (Cameron, *et al*., 2018; Evans *et al*., 2018; Liu *et al*., 2016; Wood and Su, 2017).

Gunn and Fisk (2013) have considered this problem further and concluded that there is a tension between treating students as consumers (*cynicism*), ensuring that Higher Education offers value to all stakeholders (*pragmatism*) and the desire to deliver excellent teaching (*aspirationalism*). For example, students may wish to focus upon achieving specific learning objectives, whereas teachers on the same course may wish to concentrate on challenge, efficiency and inclusion (Trigwell, 2001).

That we need to understand the effectiveness of our teaching is beyond dispute, and how students perceive their own learning based upon the teaching that we provide is an integral part of this multi-dimensions problem, but how we evaluate our teaching, and against which criteria, is yet to be determined to the satisfaction of the sector. If consideration of the perception of students' learning is being undertaken, then understanding the effectiveness of the potential current known methods is a prerequisite (Cahill, Turner and Barfoot, 2010). This is problematic for the Higher Education sector, as a different model is required beyond those already considered by the Office for Students' research (Jones-Devitt *et al*., 2019).

Such a new model does exist, and it was first discussed at the Higher Education Academy Surveys Conference (Polkinghorne *et al*., 2017b). This novel approach deviates from traditional thinking as it integrates both student explicit knowledge (the verbalisation and codification of subject knowledge), and tacit knowledge (practical application and experience). As a result, the

model creates a two-dimensional evaluation of the *Learning Gain* achieved by a student. Use of the model has previously been reported (Polkinghorne *et al.*, 2019), and this paper will now discuss the application of model itself in more detail.

Research approach and method

This research has followed the philosophy of interpretivism to enable it to explore the relevant views and opinions of the participants, and uses a cross-sectional time horizon, with an inductive approach to create a theoretical position from incomplete qualitative data from which patterns and trends can be identified (Saunders *et al*., 2016).

Self-reflective surveys that collected ordinal (ranked) data formed the basis of the primary data collection. Questions were designed using the model for evaluating student *Learning Gain* proposed by Polkinghorne *et al.* (2017b), and expanded upon later in this paper.

The questions created considered two distinct conceptual dimensions, these being:

1. *Distance Travelled* (explicit knowledge). Explicit knowledge relates to subject learning that can be codified and verbalised. Examples of this would include models, theories and tools,
2. *Journey Travelled* (tacit knowledge). Tacit knowledge relates to practical know-how and experience.

For each question, descriptive linguistic labels were included across the Likert scale used to increase the validity and reliability of the data collected**.** Analysis was then undertaken to ensure that internal reliability was satisfied, and that the data collected was meaningful. A

pilot test was then undertaken using independent participants to ensure questions being asked were not ambiguous, i.e. face validity (Saunders *et al*., 2016, 716).

The pilot test was also used to confirm that participant information and instructions were clear. To ensure clear distinction in the questions, discriminant validity (Bell *et al*., 2018) was used. This avoids the possibility of participants being confused by what they consider to be overlapping questions. The *SurveyMonkey* digital platform was used for online data collection. Sampling used a self-selection purposive strategy. The population was heterogeneous in nature, the major differentiating characteristic being gender and project type.

For this pilot study, a cohort of final year students studying business studies at Bournemouth University's AACSB accredited Business School were investigated to provide data from which the new model for evaluating student *Learning Gain* could be explored. The learning of each student was considered for their final year project (dissertation). As detailed below, there were three options for final year project, these being Research Projects, Reflective Practitioner Projects and Consultancy Projects:

- **Consultancy Project** – These projects are undertaken on a group or individual basis, and have a 'real–life' business focus with an emphasis on project management,
- **Reflective Practitioner Project** – These projects are undertaken on an individual basis, and have a reflective focus based upon a work-based problem or situation,
- **Research Project** – These projects are undertaken on an individual basis, and have a critical thinking focus to analyse data relating to a problem or opportunity.

As detailed in Table 1, the student cohort had a controlled gender balance to ensure results were not skewed, and Research, Consultancy and Reflective Practitioner projects were considered in equal numbers.

Gender	Consultancy Projects	Reflective Practitioner Projects	Research Projects	Total Students
Female	2	2	2	**6**
Male	2	2	2	**6**
				12

Table 1. Validity Matrix for *Learning Gain* Data Collection

This study received ethical approval from Bournemouth University. The research has been undertaken in compliance with the agreed ethical code of practice (Reference 9236). All data was collected anonymously, with data analysis being delayed until after the final exam board for which student marks were agreed and then published. The ethical approval also placed the following restrictions on the research:

1. Only students supervised by a single academic could be included in this pilot study,
2. Students were free to participate or not without any pressure of inducement being offered,
3. Students could leave the research at any time without the need for explanation or justification.

The model

Research undertaken by Polkinghorne *et al*., (2017a) reviewed multiple stakeholder perspectives from across the Higher Education sector regarding how student *Learning Gain*

could be effectively evaluated. Based upon the combined views collected, this previous study determined that to be successful, any new method of evaluating student *Learning Gain* would need to adopt ten basic principles as detailed in Table 2.

1. Minimises administrative effort	6. Captures the diversity of subjects
2. Focusses on *Learning Gain* not outcomes	7. Accommodates variations in teaching styles
3. Avoids using existing data sources	8. Supports improvements in teaching
4. Supports the development of students	9. Supports continuous improvement
5. Ignores external factors	10. Relevance to key stakeholders

Table 2: Ten Basic Principles for the Successful Evaluation of *Learning Gain* – Revised (adapted from Polkinghorne *et al*., 2017a, p.227)

Kember (1997) presented the 5 major conceptions of teaching in Higher Education as being 1) imparting information, 2) transmitting structured knowledge, 3) interactions between the teacher and the student, 4) facilitating student understanding, and 5) stimulating conceptual change. It is the latter two of these conceptions that most relate to *Learning Gain*.

Furthermore, work undertaken by Little *et al.*, (2007) suggests that, from a student perspective, learning is actually about 1) increasing knowledge, 2) memorising information, 3) the acquisition of facts, 4) the abstraction of meaning, and 5) an interpretative process to understand reality. These are important considerations in the context of evaluating *Learning Gain* and, taking all them into account, and combining them with the ten principles discussed previously (Table 2), a new model for evaluating student *Learning Gain* was derived which uses three sets of indicators (Table 3).

The indicators are *Process Indicators* which relate to the actual collection of the *Learning Gain* data, *Output Indicators* which relate to student learning being reported, and *Outcome Indicators* which describe impact and longer-term benefits for teaching on modules/courses

across the Higher Education sector. Alongside the *Process, Output* and *Outcome Indicators*, consideration of Bloom's (revised) *Taxonomy of Higher Order Thinking Skills* was necessary. This taxonomy is listed in order of significance in Table 4 (Anderson and Krathwohl, 2001).

Process Indicators (relating to the collection of data)
• Avoids national data from existing sources, • Collects data at the lowest possible level, • Provides cost efficient to administer and analyse, • Permits diversity, • Permits inclusivity and representativeness, • Permits validity and comparability, • Provides a longitudinal perspective.
Output Indicators (relating directly to student learning)
• Supports student development as an independent autonomous researcher, • Supports student competencies and personal development, • Supports student subject knowledge and skills, • Supports student intellectual stimulation and challenge.
Outcome Indicators (relating indirectly to longer-term benefits)
• Encourages improved teaching and the raising of standards, • Encourages the use of new learning and teaching styles/methods, • Supports the continuous improvement of educational delivery, • Supports innovation and experimentation within teaching and learning, • Supports the managerialism, market and performativity agendas.

Table 3: Foundation Indicators of New Model for Evaluating Student *Learning Gain*

Bloom's taxonomy is a representation of which thinking skills should be applied at lower levels of Higher Education, and which ones should be applied at higher levels of Higher Education. For example, at Level 4 – first year undergraduate degree, there should be more concentration on remembering and understanding, and at Level 6 – final year undergraduate

degree and Level 7/8 - postgraduate degrees, there should be much more focus upon creating and evaluating.

1. Creating	1. Applying
2. Evaluating	2. Understanding
3. Analysing	3. Remembering

Table 4: Adapted from Bloom's (Revised) *Taxonomy of Higher Order Thinking Skills* (Anderson and Krathwohl, 2001)

The *Intended Learning Outcomes* (ILOs) for the final year Business Studies degree course dissertation (project) module being considered in this research study were:

1. Competencies for undertaking a research or consulting project effectively and in a professional manner, including the ability to manage complexity, ambiguity, and uncertainty, and novelty,
2. Ability to communicate effectively with all stakeholders, for all stages in a project, including the final write-up of the project and its findings,
3. Critical and contemporary understanding of the context and the body of information and knowledge that underpins the project,
4. Critical evaluation and justification of relevant and feasible alternative courses of action and any recommended solution(s),
5. Independent, reflective and ambitious learning that has taken place as a result of the involvement with the project.

Taking into account the *Intended Learning Outcomes* described above, and the *Process, Output* and *Outcome Indicators* of the model, eight questions were developed to evaluate the student *Learning Gain* relating to Research Methods on the project module. Four questions were developed that related to the *Distance Travelled* (explicit knowledge that can be

codified) being reported by the student participants, and four questions related to their *Journey Travelled* (tacit knowledge based upon experience). The questions created are detailed in Table 5.

Questions Relating to Distance Travelled	Questions Relating to Journey Travelled
Q1 - How much has your understanding of how to apply appropriate research methods to real projects increased?	**Q2 -** How much have your skills for writing a research project report increased?
Q3 - How much has your understanding of how to undertake a literature review increased?	**Q4 -** How much have your skills for evaluating results increased?
Q5 - How much has your understanding of how to develop a research methodology increased?	**Q6 -** How much have your skills to critically analyse findings and results increased?
Q7 - How much has your understanding of the importance of research integrity increased?	**Q8 -** How has undertaking your project developed your experience of solving problems and evaluating options?

Table 5: Questions Relating to *Distance Travelled* and *Journey Travelled*

It was considered important that the questions asked to evaluate the *Learning Gain* of students took into account the level of their studies. To ensure an even distribution between the questions asked, and the top four thinking skills defined in Table 4, the eight questions created were mapped against the top four levels of Bloom's (revised) *Taxonomy of Higher Order Thinking Skills* (Figure 1). The top four levels were selected because the pilot cohort of students were studying at level 6 (undergraduate final year).

	Bloom's (Revised) Taxonomy of Higher Order Thinking Skills									
	Creating		Evaluating		Analysing		Applying			
Questions Relating to Research Methods	Distance Travelled	Journey Travelled	Distance Travelled	Journey Travelled	Distance Travelled	Journey Travelled	Distance Travelled	Journey Travelled		
Q1 - How much has your understanding of how to apply appropriate research methods to real projects increased?							✓			
Q2 - How much have your skills for writing a research project report increased?		✓								
Q3 - How much has your understanding of how to undertake a literature review increased?			✓							
Q4 - How much have your skills for evaluating results increased?				✓						
Q5 - How much has your understanding of how to develop a research methodology increased?	✓									
Q6 - How much have your skills to critically analyse findings and results increased?						✓				
Q7 - How much has your understanding of the importance of research integrity increased?					✓					
Q8 - How has undertaking your project developed your experience of solving problems and evaluating options?								✓		

Figure 1. Schema Mapping Questions Against Higher Order Thinking Skills

The *Output Indicators* defined in Table 3 relate to the expected development of individual students. The eight questions created to evaluate the *Learning Gain* of students were therefore also mapped against the *Output Indicators* to ensure that a complete coverage had been accomplished (Figure 2), and that no single *Output Indicator* was being under-represented.

To determine each student's opinions against each of the eight questions, a Likert scale (Likert 1932) was employed that used the descriptive range of linguistic labels '*No Change*, '*Minor Improvement*, '*Moderate Improvement*, '*Significant Improvement'* and '*Exceptional Improvement'*. Students were asked to consider which of these response options best fitted their personal development to establish the pattern of how they perceived the change in their own learning and understanding from studying the module.

	Output Indicators			
Questions Relating to Research Methods	**Independent Autonomous Researching**	**Competencies & Personal Development**	**Subject Knowledge & Skills**	**Intellectual Stimulation & Challenge**
Q1 - How much has your understanding of how to apply appropriate research methods to real projects increased?	✓	✓	✓	
Q2 - How much have your skills for writing a research project report increased?	✓	✓	✓	
Q3 - How much has your understanding of how to undertake a literature review increased?	✓	✓	✓	
Q4 - How much have your skills for evaluating results increased?	✓	✓		✓
Q5 - How much has your understanding of how to develop a research methodology increased?	✓	✓	✓	
Q6 - How much have your skills to critically analyse findings and results increased?	✓	✓		✓
Q7 - How much has your understanding of the importance of research integrity increased?	✓		✓	
Q8 - How has undertaking your project developed your experience of solving problems and evaluating options?	✓	✓		✓

Figure 2. Schema Mapping Questions Against *Output Indicators*

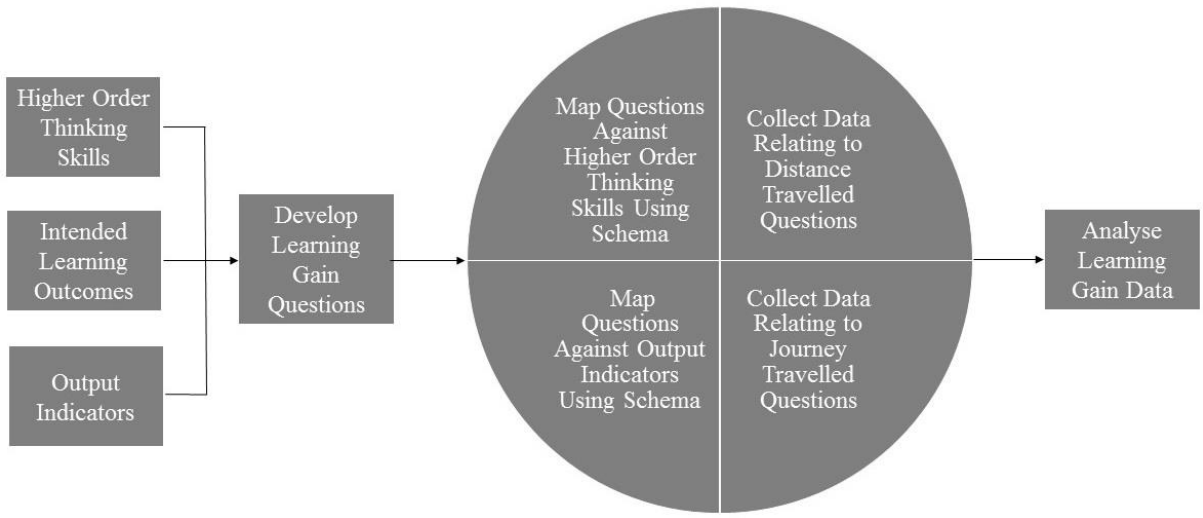

Figure 3. Full Conceptual Model for Evaluating *Learning Gain* Data

Integrating the elements discussed together, a conceptual model for the evaluation of student *Learning Gain* can be visualised (Figure 3). The model demonstrates how the *Higher Order Thinking Skills*, *Intended Learning Outcomes* for the module being taught, and *Output Indicators* are combined to create a set of evaluation questions from which both the *Distance Travelled*, and *Journey Travelled*, of a student's perceived learning can be determined.

Data Collection

Data was collected from the pilot cohort of students in accordance with the validity matrix defined in Table 1, and using the questions relating to *Distance Travelled* and *Journey Travelled* specified in Table 5. The Likert based responses from each student to the eight questions were coded to enable subsequent analysis. The coding options applied to each *Learning Gain* response were in the range 0 (No Change) to 4 (Exceptional Improvement) and are detailed in Table 6.

Linguistic Label	Code Applied
No Change	0
Minor Improvement	1
Moderate Improvement	2
Significant Improvement	3
Exceptional Improvement	4

Table 6. Coding Options Applied to *Learning Gain* Data

An identifying code was applied to each student to preserve their anonymity, whilst retaining a sense of which data was associated with which participant. The coding system for the students was based upon the following system: *Project Type Identifier – Gender Identifier*

Numerical Identifier. The project type options included Consultancy Project (CP), Research Project (RP), and Reflective Practitioner Project (RPP).

For example, code CP-M2 is the second male consultancy project student, whereas code RP-F1 is the first female research project student. The data collected from the students relating to the eight questions (Q1 to Q8) are detailed in Table 7, with each student being coded in the manner described above, and with the data itself being coded using the numerical range highlighted in Table 6.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Student CP-M1	4	1	0	3	2	3	2	4
Student CP-M2	3	3	2	4	2	4	3	4
Student CP-F1	4	0	0	3	0	3	3	3
Student CP-F2	3	2	0	2	2	3	3	2
Student RP-M1	3	1	3	2	2	3	2	2
Student RP-M2	3	3	3	1	2	3	0	0
Student RP-F1	3	3	3	2	3	3	1	3
Student RP-F2	3	4	3	3	3	4	3	4
Student RPP-M1	3	2	2	3	2	4	2	3
Student RPP-M2	2	4	3	3	3	3	4	3
Student RPP-F1	3	3	3	3	3	3	2	3
Student RPP-F2	3	4	4	3	4	3	3	3

Table 7. Application of RAG Criteria to Individual Student *Learning Gain* Reported

Each student response has been further enhanced with the introduction of a *Red Amber Green* (RAG) style greyscale identifier to indicate the positiveness of responses. The RAG criteria applied are detailed in Table 8.

RAG Status	Learning Gain Code	Suggested Action
	3 or 4	Identify and disseminate teaching best practice as part of continuous learning cycle.
	2	Monitor and seek mechanisms for more successful engagement with students.
	0 or 1	Urgently evaluate issues and/or barriers restricting student learning.

Table 8. Definitions of RAG Criteria Applied to Student *Learning Gain* Data

Applying a student lens, the RAG identifiers demonstrate when an individual student considers that their own learning against each of the questions is more or less positive. This is useful information, and it has the potential to be able to direct the educator to the students who need further assistance and guidance in particular areas of the curriculum.

For low level responses from an individual student (a response with a code of 0 or 1) there are likely to be potential issues in student learning that need to be addressed urgently. Any identifiable issues/barriers may need to be investigated, and/or the teaching materials and practices being employed may need to be reviewed.

For medium level responses (a response with a code of 2), then it is recommended that the situation is monitored, and that the educator seeks to identify how students can be engaged more successfully, and to seek opportunities for incremental innovation and improvement in their teaching delivery to enhance the perceived learning achieved.

For high level responses (a response with a code of 3 or 4), then the delivery of teaching is potentially generating a very positive learning response, and good practice should be identified and disseminated where appropriate.

Data Analysis

From the participant student responses in Table 7, there is evidence that 50% of students (CP-M2, RP-F1, RP-F2, RPP-M2, RPP-F1 and RPP-F2) reported strong levels of perceived learning against at least six of the eight *Learning Gain* questions asked. Strong levels of learning in this context are responses based upon *Significant Improvement* or *Exceptional Improvement* in a student's own perception of their learning.

Interestingly, two students (CP-M2 and RP-M2) reported very mixed learning with responses to at least four questions indicating strong levels of learning, and yet responses to at least three questions representing low levels of learning. Low levels of learning in this context are responses based upon *No Change* or *Minor Change* in a student's own perception of their learning.

Considering the individual questions, the learning being reported for Q1 *(How much has your understanding of how to apply appropriate research methods to real projects increased?)* and Q6 *(How much has your understanding of the importance of research integrity increased?)* is particularly high suggesting successful intervention has occurred in both of these areas of the curriculum. In contrast, the responses for Q5 *(How much has your understanding of how to undertake a literature review increased?)* and Q7 *(How much have your skills for evaluating*

results increased?) registered much lower levels of perceived learning which implies that there is scope for evolving the teaching methods and associated materials in these areas of the curriculum to ensure that learning becomes more effective and engaging.

The mean *Learning Gain* has been determined by taking the average of the perceived learning reported against each of the eight questions presented to participants (Table 9). Whilst it must be remembered that these are codes, not actual numbers, taking the mean code remains a valuable method of revealing the patterns for which students are reporting the most learning, and for which are reporting the least. Students RP-F2 (3.38) and RPP-F2 (3.38) reported the highest overall perceived *Learning Gain* across the eight questions presented. Conversely, students CP-F1 (2.00) and RP-M2 (1.88) reported the lowest overall perceived *Learning Gain*.

Mean Student Learning Gain

	Distance Travelled	***Journey Travelled***	***Overall***
Student CP-M1	2.00	2.75	2.38
Student CP-M2	2.50	3.75	3.13
Student CP-F1	1.75	2.25	2.00
Student CP-F2	2.00	2.25	2.13
Student RP-M1	2.50	2.00	2.25
Student RP-M2	2.00	1.75	1.88
Student RP-F1	2.50	2.75	2.63
Student RP-F2	3.00	3.75	3.38
Student RPP-M1	2.25	3.00	2.63
Student RPP-M2	3.00	3.25	3.13
Student RPP-F1	2.75	3.00	2.88

Student RPP-F2	3.50	3.25	3.38

Table 9. Student *Learning Gain* Reported for *Distance Travelled* and *Journey Travelled*

Whilst it must be remembered that these are codes, not actual numbers, taking the mean code remains a valuable method of revealing the patterns for which students are reporting the most learning, and for which are reporting the least. Students RP-F2 (3.38) and RPP-F2 (3.38) reported the highest overall perceived *Learning Gain* across the eight questions presented. Conversely, students CP-F1 (2.00) and RP-M2 (1.88) reported the lowest overall perceived *Learning Gain*.

It is also possible to isolate the mean responses that related to *Distance Travelled* (Q1, Q3, Q5 and Q7) and to *Journey Travelled* (Q2, Q4, Q6 and Q8). Those students reporting mean overall high or low *Learning Gain* responses also reported mean high or low *Distance Travelled* and *Journey Travelled* responses respectively. However, student CP-M2 reported an exceptionally higher level of *Journey Travelled*, compared to a much lower *Distance Travelled*, which indicates a greater practical understanding and a lesser theoretical knowledge. Students RPP-M1 and CP-M1 reported a similar effect. Conversely, student RP-M1 reported that their perception of their own learning for *Distance Travelled*, significantly exceeded the learning for *Journey Travelled* which would imply a greater theoretical knowledge and a lesser practical understanding has been gained.

Limitations and threats to validity

The comparison between the students within this pilot study has provided a useful indication of how the new model could be used to identify variations in the perceived learning recognised by each student. However, this is a small test cohort, and an increased number of participating students would have strengthened the findings. It is important to note that this

study is collecting subjective qualitative data based upon the views and opinions of the participants. Although a small group, applying this lens has been useful to provide an initial indication concerning what the model can tell us about students' perceptions of their own learning. Further subsequent cross-sectional and longitudinal studies are proposed, and these will include larger cohorts of students to enable the potential impact of using this model to be more fully evaluated.

It is also noted that all of the students in the pilot study were studying in the same year of the same Business Studies course, and with the same dissertation supervisor. Business courses are by their very nature multi-disciplinary courses. Testing the model with students studying at different academic levels, and on a variety of courses in different discipline areas, would also expand our understanding of the functionality of the model.

A further investigation, and more in-depth study, is therefore required to explore these parameters more fully, and this will be the focus of a subsequent paper.

Conclusion

The model was applied to a cohort of business studies students undertaking their final year project dissertations to determine if any understanding of how students perceived their own learning would become apparent. The expectation was that should such understanding be revealed, then this data could then be used to inform the continuous improvement process for teaching on the module for subsequent student cohorts.

The students were asked to reflect and self-report their own perceptions of how their learning had changed from studying the module. The data collected was therefore qualitative and subjective in nature, as it represented the views and opinions of the participating students.

Whether the data concerning student learning provides any true indication of teaching quality is uncertain due to the plethora of other influencing factors, the most important of which is the attitude of the individual student, and the level of responsibility that they are willing to take for their own personal development. Nevertheless, some students revealed that they considered they had gained more in terms of tacit knowledge (*Journey Travelled*) and others that they had experienced more significant *Learning Gain* concentrated upon explicit knowledge (*Distance Travelled*).

Importantly, using the model produced results which the project dissertation supervisor could subsequently use when deciding how best to personalise the support that they offer to each student. Viewing how a student perceived their own learning experience through this lens was revealing, and this development will therefore be relevant and interesting for other countries operating a similar Higher Education system.

References

Anderson, L., & Krathwohl, D. 2001. ***A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives***. New York: Longmans.

Arum, R., & Roska, J. 2011. ***Academically Adrift: Limited Learning on College Campuses.*** Chicago: University of Chicago press.

Banta, T., & Pike, G. 2012, ***Making the Case Against – One More Time…*** Champaign: National Institute for Learning Outcomes.

Bell, E., Bryman, A., & Harley, B. 2018. ***Business Research Methods***. 5th Edition. Oxford: Oxford University Press.

Boothe, J., Barnard, R., & Peterson, L. 2018. The relationship between subject matter knowledge and teaching effectiveness of undergraduate chemistry peer facilitators. ***Chemistry Education Research and Practice*** 19 (1): 276-304. doi: 10.1039/C7RP00171A

Bowman, N. 2010. Can 1st-year college students accurately report their learning and development? ***American Educational Research Journal*** 47 (2): 466-496. doi: 10.3102/0002831209353595

Brew, A. 2007. Integrating research and teaching: understanding excellence. In ***International Perspectives on Teaching Excellence in Higher Education: Improving Knowledge and Practice***, edited by A. Skelton. Abingdon: Routledge.

Cahill, J., Turner, J., & Barfoot, H. 2010. Enhancing the student learning experience: The perspective of academic staff. ***Educational Research*** 52 (3): 283-295. doi: 10.1080/00131881.2010.504063.

Cameron, A., Wharton,Y., & Scally, J. 2018. An investigation into the comparative learning gain and 'value added' for students from widening participation and non-widening participation groups: A case study from sports degrees. ***Higher Education Pedagogies*** 3 (1), 83-102. doi: 10.1080/23752696.2018.1435297

Capizzo, M., Nuzzo, S., & Zarconne, M. 2006. The impact of the pre-instructional cognitive profile on learning gain and final exam of physics courses: A case study. ***Journal of Engineering Education*** 31 (6): 717-727. doi: 10.1080/03043790600911811

Dearing, R. 1997. ***Higher Education in the Learning Society***. Report of the National Committee of Enquiry into Higher Education. London: Her Majesty's Stationery Office. (HMSO).

Department for Business, Innovation & Skills. 2015. ***Fulfilling our Potential: Teaching Excellence, Social Mobility and Student Choice*.** London: Department for Business, Innovation and Skills.

Douglas, J., Thomson, G., & Zhao, C. 2012. The learning race: The value of self-reported gains in large research universities. ***Higher Education*** 63 (3): 317-335. doi: 10.1007/s10734-011-9496-x

Evans, C., Howson, C., & Forsythe, A. 2018. Making sense of learning gain in higher education. ***Higher Education Pedagogies***, 3 (1): 1-45. doi: 10.1080/23752696.2018.1508360

Gunn, V., & Fisk, A. 2013. ***Considering Teaching Excellence in Higher Education: 2007-2013. A Literature Review Since the CHERI Report 2007***. The Higher Education Academy Research Series. York: HEA.

Jones, S., Pampaka, M., Swain, D., & Skyrme, J. 2017. Contextualising degree-level achievement: An exploration of interactions between gender, ethnicity, socio-economic status and school type at one large UK university. ***Research in Post-Compulsory Education*** 22 (4): 455-476. doi: 10.1080/13596748.2017.1381287

Jones-Devitt, S., Pickering, N., Austen, L., Donnelly, A., Adesola, J., & Weston, A. 2019. ***Evaluation of the National Mixed Methods Learning Gain Project (NMMLGP) and Student Perceptions of Learning Gain***. Report to the Office for Students. Sheffield: Sheffield Hallam University.

Kember, D. 1997. A reconceptualisation of the research into university academics conceptions of teaching. ***Learning and Instruction*** 7 (3): 255-75. https://doi.org/10.1016/S0959-4752(96)00028-X

Kooloos, J., Klassen, T., Vereiken, M., Van Kuppeveld, S., Bodhuis, S., &Vorstenbosch, M. 2011. Collaborative group work: effects of group size and assignment structure on

learning gain, student satisfactions and perceived participation. ***Medical Teacher*** 33 (12): 983-988. doi: 10.3109/0142159X.2011.588733

Likert, R. 1932. A technique for the measurement of attitudes. ***Archives of Psychology*** 22 (140): 55.

Little, B., Locke, W., Parker, J., & Richardson, J. 2007. ***Excellence in Teaching and Learning: A Review of the Literature for the Higher Education Aca****demy*. Milton Keynes: Open University.

Liu, O. 2011. Measuring value-added in higher education: conditions and caveats – Results from using the measure of academic proficiency and progress. ***Assessment and Evaluation in Higher Education***, 36: 81-94. doi: 10.1080/02602930903197917

Liu, O., Liu, H., Roohr, K., & McCaffrey, D. 2016. Investigating college learning gain: Exploring a propensity score weighting approach. ***Journal of Educational Measurement*** 53(3): 352-367. doi: 10.1111/jedm.12112

Macfarlane, B. 2016. The performative turn in the assessment of student learning: A rights perspective. ***Teaching in Higher Education*** 21 (7): 839-853. doi: 10.1080/13562517.2016.1183623

McGrath, C., Guerin, B., Harte, E., Frearson, M., & Manville, C. 2015. ***HEFCE Report - Learning Gain in Higher Education***. Santa Monica, US: RAND Corporation.

Neves, J. & Hewitt, R. 2020. ***Student Academic Experience Survey***. Oxford: Higher Education Policy Institute and Advance HE.

Polkinghorne, M., & Roushan, G. 2017. Assessing student learning: A comparison of existing methods for evaluating the learning gain of students. Poster session presented at the ***Celebrate Regional Teaching and Learning Conference 2017***, Bournemouth University, June 13.

Polkinghorne, M., Roushan, G., & Taylor, J. 2017a. Considering the marketing of higher education: The role of student learning gain as a potential indicator of teaching quality. ***Marketing for Higher Education*** 27 (2): 213-232. doi: 10.1080/08841241.2017.1380741

Polkinghorne, M., Roushan, G., & Taylor, J. 2017b. Evaluating student learning gain: An alternative perspective. Poster session presented at the ***Higher Education Academy (HEA) Surveys Conference 2017 – Understanding and Enhancing the Student Experience.*** Manchester, May 11.

Polkinghorne, M., O'Sullivan, H., Taylor, J. & Roushan, G. 2019. An Innovative Framework for Higher Education to Evaluate Learning Gain: A Case Study Based upon the Discipline of Marketing. ***Studies in Higher Education***. doi: 10.1080/03075079.2019.1703132

Porter, S. 2012. Self-reported learning gains: A theory and test of college student survey response. ***Research in Higher Education*** – *New York* 54 (2): 201-226. doi: 10.1007/s11162-012-9277-0

Randles, R., & Cotgrave, A. 2017. Measuring student learning gain: a review of transatlantic measurements of assessments in higher education. ***Innovations in Practice*** 11 (1): 50-59.

Roohr, K., Liu, H., & Liu, O. 2017. Investigating student learning gains in college: a longitudinal study. ***Studies in Higher Education*** 42 (12): 2284–2300. doi: 10.1080/03075079.2016.1143925

Saunders, M., Lewis, A. & Thornhill, A. 2016. ***Research Methods for Business Students***, 7th Edition. London: Pearson.

Skelton, A. 2005. ***Understanding Teaching Excellence in Higher Education: Towards a Critical Approach***. Edited by G. Nicholls and R. Barnett. Abingdon: Routledge.

Trigwell, K. 2001. Judging University Teaching. ***International Journal for Academic Development*** 6: 65–73. doi.org/10.1080/13601440110033698

Willoughby, S., and Metz, A. 2009. Exploring the differences with different gain calculations in astronomy and biology. ***American Journal of Physics*** 77 (7): 651-657. doi: 10.1119/1.3133087

Wood, M., & Su, F. 2017. What makes an excellent lecturer? Academics' Perspectives on the discourse of 'teaching excellence' in higher education. ***Teaching in Higher Education*** 22(4): 451-466. doi: 10.1080/13562517.2017.1301911