

Students' perspective on the relevance of Sustainability Literacy in a postgraduate Built Environment programme

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Students' perspective on the relevance of Sustainability Literacy in a postgraduate built environment programme

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Achieving Sustainable Development in the built environment requires the human resource with the right sustainability knowledge and skills to respond to the challenge facing the construction industry. It is argued that Educational Institutions have a key role to play in educating future generations with the right sustainability knowledge and skills. This research aims at exploring the relevance of sustainability literacy to postgraduate students on Quantity Surveying (QS) course at the London South Bank University. The study adopts a mixed method approach that examines students' perspective on the important of sustainability literacy and how it has been integrated in the programme through interview with 15 students followed by a survey with 98 part-time and full-time students on the course. The results revealed that students value sustainability knowledge and skills. Most students believe that they need sustainability literate to be competitive in the job market. More than half of the students; 53 percent argue that sustainability literacy was delivered sometimes with a satisfaction rate of 45%, which shows that students are not really happy with how sustainability literacy has been embedded in the course and argues that more needs to be done to fully integrate sustainability literacy in the programme.

Keywords: Built Environment, Education for sustainable development, Higher education, Quantity surveying, Sustainability literacy

Introduction

Despite the relevance of sustainability knowledge to the built environment and the construction industry, research has shown that there is a low level of awareness and understanding of sustainable construction related issues (Dale, 2007; Dixon et al., 2008; CIOB, 2013; RIBA, 2014; Higham and Thomson, 2015). The concept of Education for Sustainable Development (ESD) is gaining interest and importance in the field of educational policy, practice and research. The role of education in achieving the sustainable development goals need to be continuously promoted. The concept "Education for sustainability" (ESD) is used to describe learning for sustainability where graduates take responsibility for creating a sustainable society. Students are increasingly being aware and concern about the issues of sustainable development, the environment, and climate change, and this is encouraging academics to embed sustainability into the curriculum (Bone and Agombar, 2011). It is believed that a growing proportion of employers want to attract recent graduates with responsible values on sustainable development (Hanover Research, 2011). Higher Education Institutions (HEIs) plays a key role in educating future generations of citizens, consumers, investors, entrepreneurs, leaders, and decision-makers and should embed sustainability principles in the curricula to empower graduates to contribute towards achieving a more sustainable society. Martin and Jucker (2005) describe Universities as

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3 the most important organization to help the drive towards achieving sustainable development by
4 addressing the sustainability agenda through the curriculum. [The Environmental Association for](#)
5 [Universities & Colleges \(EAUC\)](#) (2009) describe Education for Sustainable Development (ESD)
6 as finding and using opportunities to include environmental, economic and social issues in the
7 curriculum. There is a rise in sustainability-related educational programs across the world
8 currently due to the increasing student interest in learning more about the field of sustainability
9 and employers desire to hire graduates with sustainability backgrounds (Hanover Research,
10 2011).
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14 ESD seeks to develop student's behaviour to respect environmental, social and cultural
15 differences which are the central part of our world; appreciation that we are all part of a common
16 society and humanity depends on the environment for their wellbeing (EAUC, 2009). The United
17 Nations realised the essential role of teaching, learning and research in promoting sustainability
18 and declared 2005 to 2014 as the decade for Education for Sustainable Development (UNESCO,
19 2005). Subsequently, the UK government developed a sustainable development strategy in 2005;
20 "Securing the Future: delivering the UK sustainable development strategy". The strategy pointed
21 out the important role of education in providing the [current generation](#) with the skills and the
22 knowledge toward achieving sustainable development. It argues that sustainability literacy
23 should be a core competence among graduates (DEFRA, 2005). [Throughout the context of this](#)
24 [study, the following terms are used interchangeably: "Integration" and "Embedded". In this](#)
25 [study "integration" means becoming part of the course structure/content or the curriculum while](#)
26 ["embedded" describes the incorporation into or as integral part of the course or curriculum.](#)
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31 This research is based on an investigation into students' perspective on the importance of
32 sustainability literacy in the delivery of postgraduate MSc Quantity Surveying course at the
33 London South Bank University (LSBU) which is accredited by the Royal Institution of Chartered
34 Surveyors (RICS). The programme is completed over 2 semesters for full-time students or 4
35 semesters for part time students, plus dissertation. The course consist of three (3) supplementary
36 level 6 modules at the beginning of the course to bring non-cognate students up to speed with
37 masters level education in relation to Construction Technology, Law and Contract
38 Documentation and Administration before students embark on the masters level modules. The
39 main MSc programme consist of six (6) level 7 core modules plus one (1) level 7 optional
40 module. This paper therefore aims at examining the importance of sustainability literacy to
41 students and the extent of integration into the Postgraduate Quantity Surveying (QS) course at
42 the London South Bank University. The next part of the paper provides a review of relevant and
43 current literature on education for sustainable development and its delivery in the built
44 environment. The final part discusses the research approach which adopts both qualitative and
45 quantitative data collection on students' perspective on the importance of sustainability literacy
46 and how it has been integrated into the QS programme. It also presents conclusions and
47 recommendations for academics with the desire to embed sustainability literacy in a built
48 environment programme at the higher education sector.
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The Concept of Sustainable Development

The concept of Sustainable Development (SD) has been defined in many ways but the most commonly used definition is the one in Brundtland's commission 1987 report of the United Nations World Commission on Environment and Development: Our Common Future which defines sustainable development as:

“Meeting the needs of the present without compromising the ability of future generations to meet their own needs... A process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations” (Brundtland, 1987:43).

However, Opoku and Ahmed (2013:141) address the concept of need and human behaviour in achieving sustainability by defining Sustainable Development as:

“The adjustment of human behaviour to address the needs of the present, without compromising the ability of future generations to meet their own needs”.

Sustainable development ensures a better quality of life for all now and future generations through the protection of the environment to meet our social needs and the promotion of successful economies. Sustainable development could be embedded in the curriculum by fully integrating it into courses or embedding in a particular module of a course (EAUC, 2009). Education for sustainable development involves the development of students who believe in the promotion of global citizenship, environmental stewardship, social justice, ethics and wellbeing to ensure sustainable future (Longhurst et al., 2014). Graduates should be well prepared with the appropriate sustainable development knowledge and skills to deal with the problems society faces today.

Education for Sustainable Development

Higher Education Institutions are integrating sustainability literacy into built environment courses due to the increasing need for sustainability literate graduates and professionals (Xia et al., 2016). Edwards (2004) argues that, Higher Education Institutions providing built environment training and education are more aware of the role of the built environment towards achieving a more sustainable society. Education for Sustainable Development describes the process of teaching and learning that concentrates on the long term future of the environment, the economy and the society (UNESCO, 2005). Longhurst et al. (2014:5) define Education for sustainable development (ESD) as:

“The process of equipping students with the knowledge and understanding, skills and attributes needed to work and live in a way that safeguards the environmental, social and economic wellbeing, both in the present and for future generations”.

However, Sustainability Literacy is described as the knowledge and understanding to make decisions and act more sustainably as part of individual and collective change by rewarding

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3 decisions towards sustainable development (Parkin et al., 2004:9). A person is said to be
4 sustainability literate when he/she "combines an understanding of the need for change with
5 appropriate knowledge and skills, and is able to recognise and reward sustainable actions in
6 others. Sustainability literacy is seen by its proponents as important for employability, effective
7 professionalism, economic performance and social wellbeing" (Murray et al., 2007:83). Parkin et
8 al., (2004) however add that sustainability literacy develops the knowledge and skills to decide
9 or act towards achieving sustainable development; recognising the need for change to a
10 sustainable way of doing things both individually and collectively as society. Sustainability
11 literacy should develop knowledge and skills that embraces the adoption of social, environmental
12 and economic aspects of sustainable development (Dyer and Selby, 2004). Educational
13 institutions have a major role to play in building the intellectual capital required by the future
14 generation in supporting society's respond to the sustainable development challenge. This can be
15 achieved by integrating sustainability literacy in the content and the delivery of the curriculum
16 (EAUC, 2009). Education for sustainable development (ESD) is more about providing students
17 with the skills to think creatively and critically, working with others and acting positively; this
18 can only be achieved through the development of curricula and pedagogy that provide students
19 the knowledge and skills to exhibit a more sustainable behaviour (HEFCE, 2009). **ESD seeks to
20 integrate the beliefs, principles and practices of sustainable development into all aspects of
21 teaching and learning.**

22 23 24 25 26 27 28 29 **Delivering sustainability Literacy through the curriculum**

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32 Employers in the built environment sector are increasingly seeking graduates who are
33 sustainability literate; higher Education providers must therefore equip graduates with the
34 relevant skills in order to enhance graduate employability (Sayce et al., 2009). Universities are
35 key actors in the delivery of the relevant skills and knowledge for sustainable development
36 (Longhurst et al., 2014). The concept of sustainability literacy is very important for graduates in
37 terms of employability, effective professionalism, economic performance and social wellbeing
38 (Murray et al., 2007). In terms of the delivery of sustainable development education
39 (sustainability literacy), Rowe (2002) support the view that sustainable development should be
40 integrated right across higher education curriculum so that every student on every course is
41 provided with the knowledge and skills needed to promote a sustainable society. Sustainability
42 literacy should be a core competency for all graduates in order to compete in the current job
43 market (Longhurst et al., 2014). Sustainability literacy could be embedded in the curriculum by
44 fully integrating it into courses or embedding in a particular module of a course.

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48 In a joint study by the UK National Union of Students (NUS) and Higher Education Academy
49 (HEA) to discover opinions on how education for sustainable development should be delivered,
50 students argued that sustainability literacy should be embedded into the existing content of the
51 curriculum (Drayson et al., 2013). They were however open to other approaches such as the
52 addition of content to the existing course, studying a specific module or taking part in
53 extracurricular activities that promotes teaching and learning of sustainable development
54 (Drayson et al., 2013). Pedagogically, teaching and learning approaches that develop stimulus
55 activities, simulation, experiential project work and problem-based learning are effective for
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3 education for sustainable development. These methods enable students to relate their learning to
4 real-life problems and situations (Longhurst et al., 2014). Education for sustainable development
5 enhances student's ability to understand and appreciate the impact of their activities and
6 decisions on the society.
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8 Sustainability literacy is currently a primary skill required of every built environment graduate
9 and therefore built environment curriculum designers should work on introducing new subjects
10 or modules or integrate sustainability themes into existing modules. According to Xia et al.
11 (2016) sustainability knowledge is delivered to Quantity surveying students by incorporating
12 relevant sustainability themes into existing subjects. However the Forum for the Future (Parkin,
13 et al., 2004) argue that embedding sustainability literacy into the curriculum across all
14 programmes is the most effective method of delivering sustainability knowledge and skills.
15 Graduate from the built Environment need the sustainability literate skills and attributes to
16 demonstrate to potential employers, however there is the view that current teaching and learning
17 approaches is failing to equip graduates with the relevant learning experience need to change the
18 existing unsustainable organisational culture in the construction industry (Higham and Thomson,
19 2015). This may require the need to build the capacity of existing academic staff to acquire
20 sustainability pedagogic skills that will enhance student learning experiences (Sayce et al.,
21 2009).
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25 The teaching of the concept of sustainability literacy in higher education is essential for students
26 of all discipline. Graduates currently leaving higher education should have the ability to think
27 and describes a learning experience that can help them understand how complex systems can
28 form mutually beneficial relationships, because graduates require the knowledge and the skill of
29 sustainable development in all careers of endeavour. It is important that graduates acquire
30 sustainability knowledge and skills needed in the current job market. The drive towards
31 achieving sustainable development demand a change in behaviour and mind-set and education
32 plays a major role. It is vital that educators in the built environment sector identify what to teach
33 in terms of sustainability literacy and more importantly how to teach the sustainability concept
34 by adopting relevant pedagogical approaches.
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39 **Research Approach**

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41 This study adopts a pragmatic philosophical stance based on both positivist and interpretivist
42 paradigms using quantitative and qualitative methods to match specific research questions.
43 Pragmatist researchers focus on the "what" and "how" of the research problem (Creswell, 2003).
44 This approach to research involves mixing both qualitative and quantitative data collection
45 methods and data analysis techniques (Creswell, 2003). A mixed methods research approach
46 provides both qualitative and quantitative evidence which gives a more complete picture of the
47 phenomena under investigation. The subject of sustainability literacy requires research
48 participants' opinions and statistical data to fully understand the concept. Mixed methods
49 research aims at drawing from the strengths of each research approach and minimizing the
50 weaknesses of any single research studies (Johnson and Onwuegbuzie, 2004).
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54 A desktop study focusing on literature review on the main theme of Education for sustainable
55 development (ESD) in the higher education was carried out followed by a detailed content
56 analysis of module guides and course materials. An audit of modules currently available within
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3 the MSc Quantity Surveying course was conducted using module guides held both in print and
4 electronically. Module guides are written by module teams to a university template and
5 guidance, and are validated through the university quality assurance structures. They include
6 identification of aims and learning outcomes, core content, the learning and teaching, assessment
7 methods and key learning resources associated with the module. In the qualitative research
8 paradigm, the most important focus is for researchers to capture accurately the existing
9 experiences and perceptions of participants involved in the phenomenon or process under
10 investigation (Onwuegbuzie and Johnson, 2006). Quantitative methods however centre on
11 objectivity and endeavour to capture reality. It allows large populations to be surveyed more
12 efficiently than other instruments providing a snapshot of its characteristics (Saunders et al.,
13 2015). Primary data was collected through semi-structured interviews and online-based survey
14 with the first year full-time and second year part-time students on the MSc Quantity Surveying
15 course at London South Bank University.
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21 **Research Findings and Discussions**

22 *Content Analysis of MSc Quantity Surveying Modules*

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26 A content analysis of the MSc Quantity Surveying programme modules shows a very low level
27 of integration of sustainability literacy in the course. **Only the Construction module out of the**
28 **three (3) Level 6 supplementary modules has sustainable development content covering the**
29 **environmental dimension of sustainability embedded in its content. However, there are two (2)**
30 **level 7 modules with sustainable development topics integrated across its content/structure;** these
31 are Project Evaluation and Procurement & management of Construction modules. Project
32 Evaluation module has sustainable development topics covering the social, economic and the
33 environmental dimensions of sustainability. The Procurement & Management of Construction
34 module however cover only the environmental dimension of sustainability. In terms of the
35 optional modules, two (2) out of the five (7) optional modules have certain level of sustainable
36 development topics/themes embedded in the delivery of the modules/subjects. The Building
37 control has topics such new technologies associated with sustainable construction while the BIM
38 and the collaborative working module have a good number of topics with sustainable
39 development integrated in the delivery. A summary of the content analysis of all the MSc QS
40 modules is presented in Table 1.
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45 [Insert Table 1]
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49 *Interview Data Analysis*

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52 **Semi-structured interviews with open-ended questions were used for the qualitative data**
53 **collection. The use of semi-structured interviews requires the interviewer to approach the**
54 **conversation with an overarching topic and go through general themes and specific questions.**
55 **The aim of the interviews was to provide an in-depth understanding of the student's perspectives**
56 **and experiences of the important of sustainability literacy and extent of integration of the**
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sustainable development topic/themes into the MSc QS course. Semi-structured interviews were carried out with fifteen (15) participants; consisting 8 part-time and 7 full-time students from the MSc QS programme. A profile of students who were interviewed is shown in Table 2. Interviews were recorded, transcribed and then checked by the interviewees to confirm accuracy and validity of responses (Opoku et al., 2016). The interview data was transcribed personally by the researcher without using software due to the limited number of interviews conducted. This was however laborious and time-consuming process but enhanced the researcher's ability to identify common themes and patterns for coding.

[Insert Table 2]

The interview data analysis involves the process of identifying and coding the themes, interpreting and providing an explanatory accounts through a review of the content. Students were asked about their understanding of sustainable development; generally interviewed student understand the concept of sustainable development but more biased towards the environmental dimension of sustainability. For example student 'B' describes sustainable development as: *"The development of buildings that are more efficient with less waste and less damage to the environment"*. Student 'E' however understands sustainable development as; *"Caring about the environment, recycling of waste, improving what is available or keeping it for the future generation"*.

In addition, student 'J' describes sustainable development as: *"The development that does not harm the environment and doesn't use more natural resources"*. While student 'K' believes that sustainable development is *"an approach to design that seeks to maximise the quality of the built environment whilst minimising the negative impact to the environment"*.

In terms of the importance of the knowledge and skills of sustainability literacy to students and their career, the general consensus was that the knowledge and skills of sustainability is very important to the interviewed students and their career. For instant, student 'G' said that: *"The sustainable development knowledge is very important to me and my career because our company (Skanska) stand for sustainable development"*. Student 'F' however added that: *"the knowledge of sustainable development is relevant to my career. Clients sometimes ask for sustainability. It is very important part or our job due to regulations and future for the environment and the society we live"*. According to student 'D' *"the knowledge of sustainable development is important, however I don't think that it necessarily translates into a better career path as yet, however, with time this may change"*.

Moreover student 'C' comments that: *"the knowledge of sustainable development is not a requirement for her job but an advantage because sustainability is at the core of the construction industry in terms of lean construction and more efficient methods of construction"*. Contrary to the above statements, Student 'E' argued that the knowledge and skills of sustainable development is not important to her by saying: *"Sustainability knowledge is not important to me; I don't have passion for the environment"*.

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In terms of how happy students are with the integration of sustainability literacy into the MSc QS course at the LSBU, it is clear that student are not happy with how the knowledge of sustainable development is being embedded in the QS course. Most students argued that emphasis is not clearly being made on sustainable development during lectures or the concept of sustainable development is not mentioned at all. Student 'N' for example said that: *"How sustainable development is embedded in the course is bad and not mentioned at all; a stand-alone module on sustainable development will be better than embedding just small topics into various modules on the course"*.

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Student 'J' highlighted her opinion by saying: *"Not really happy as there hasn't been much emphasis on sustainability throughout the course"*. According to student 'B' *"project Evaluation is the only module that covered sustainable development; the other core modules did not talk about sustainable development"*. However the module content analysis showed that the Procurement and Management in Construction module should cover some level of sustainable development. Student 'E' confirmed the above statement by saying that: *"I can't remember how sustainable development was embedded in the QS course because it was not mentioned; not much of sustainable development was taught"*. Student 'F' however comments that: *"Bits of sustainable development are embedded in the Procurement and management in construction module. However I would have preferred a separate module on sustainability which could help students to concentrate on it more"*.

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Finally, interviewed students were asked about how satisfied they are in terms of the extent of integration of sustainability literacy in the QS programme. Student 'M' commented that: *"I'm not satisfied with the extent of integration of sustainable development; there should be a separate module on sustainability, preferably a core module"*.

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In the words of student 'G' *"Fairly satisfied because sustainable development is not well covered. Had basic knowledge but would have been better with more on sustainability"*. Student 'B' however said that: *"I'm fairly satisfied but other modules did not cover sustainable development. The Procurement & management in construction module should cover more on sustainability due to the current requirements for sustainable procurement in construction industry"*.

Survey Data Analysis

The survey data collection adopts electronic methods in its questionnaire design, distribution and subsequent data collection processes. The web-based designed questionnaire with a link to the survey was sent to 26 first year full time and 92 second year part time totalling 118 MSc QS students. A total of 98 responses were received representing 83% response rate which is really excellent. This response rate was achieved due to the continuous encouragement for students to take part in the study. The survey questions consist mainly of closed-ended questions with multiple responses. The survey was designed using SurveyGizmo; which is a web-based software package used for creating online surveys, questionnaires and forms which allow the user to capture and analyse any type of data. The data collected from the questionnaire were then converted into numerical values, using a data reduction sheet.

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3 Students were asked to rate the level of important of sustainability literacy to them and their
4 career. Figure 1 presents the results which show that a total of 74% of respondents confirmed
5 that sustainability literacy is very important (37%) or important (37%) to them and their career.
6 This indicates the level of importance of the knowledge and skills of sustainable development to
7 students on the MSc QS programme. However 2% of respondents rated sustainability literacy as
8 the least important skill/knowledge.
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19 In terms of students' preferred approach to the delivery of sustainability literacy on the
20 programme, the results was clear with a majority of 61% of respondents indicating that
21 embedding sustainability literacy across the modules is the most preferred approach. On the
22 other hand 37% of students prefer sustainability literacy to be delivered as a 'standalone'
23 module; with 26% indicating that sustainable development should be a 'core module' for all MSc
24 QS students on the course. A graphical representation of the results is illustrated in Figure 2.
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28 [Insert Figure 2]
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32 When students were also asked about how often sustainability literacy is delivered across the QS
33 course, the results was discouraging with only 2% of respondents indicating that sustainability
34 literacy is 'always delivered' across the course (as shown in Figure 3). However, 53% of
35 students specified that sustainability literacy is 'sometimes delivered' while 41% said sustainable
36 development is 'often delivered'. Considering the level of importance of sustainability literacy to
37 the QS students, sustainable development related topics should be delivered regularly across the
38 programme.
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47 In terms of students' satisfaction with the extent or the level of integration of sustainability
48 literacy in the course, 45% were 'satisfied' and 27% 'very satisfied'. Surprisingly, only 2% of
49 the respondents were 'most satisfied' with the extent or the level of integration of sustainability
50 literacy in the QS course. However, 10% of the students were 'least satisfied' with the extent of
51 embedding sustainability literacy into the MSc QS course (as shown in Figure 4).
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Conclusions

The study aimed at exploring the relevance of integrating sustainability literacy to postgraduate students on a Quantity Surveying course at the London South Bank University. The MSc QS module content analysis shows that only one (1) module out of the three (3) Level 6 supplementary modules has sustainable development topic/themes covering the environmental dimension of sustainability. However, there are two (2) level 7 modules with sustainable development topics well integrated into the content/structure. There are also two (2) out of the seven (7) optional modules that have a certain level of sustainable development topics embedded in the delivery.

Primary data from the interview with the students revealed that, students generally understand the concept of sustainable development but are more biased towards the environmental dimension of sustainability. Students interviewed acknowledged the importance of the knowledge and skills of sustainable development to their career; the general consensus was that the knowledge and skills of sustainability is very important if they are to compete well in the current job market; 74% of respondents confirmed that sustainability literacy is very important. In terms of how happy students are with the delivery and the integration of sustainable development into the MSc QS course at the London South Bank University, it is clear that student are not happy with how sustainability literacy is being embedded in the QS course, with a satisfaction rate is 45%. Most students argued that emphasis is not clearly being made on sustainable development during lectures or the concept of sustainable development is not mentioned at all. The general view was that, students are not satisfied with the extent of integration of sustainability literacy into the MSc Quantity Surveying course and argues that more needs to be done to fully integrate sustainable development in the programme.

Sustainable literacy should be embedded across the curriculum, however the survey results shows that 61% of respondents' believe embedding sustainability literacy across all the modules is the most preferred approach to the delivery of sustainability literacy. Curriculum designers of courses in the built environment and relevant professional bodies should therefore consider sustainability knowledge and skill as core for graduates and professional membership. In addition, it is important that sustainability modules embedded in the curriculum consider all the three dimensions of social, economic and environmental aspects of sustainability simultaneously. Higher Education providers can contribute to the achievement of the sustainable development goals by producing graduates with the right sustainability knowledge, skills, attitudes and attributes. Like most built environment programmes, Quantity Surveying programmes are primarily accredited by professional bodies (such as the Royal Institution of chartered Surveyors-RICS and the Chartered Institute of Building-CIOB) with the view of ensuring that the curriculum provides graduates with the sustainability knowledge and skills required in the 21st century world of work. To ensure that graduates are sustainability literate, Higher Education

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3 providers are encouraged to work with professional bodies to ensure sustainability literacy is
4 fully embedded in competency framework for accredited programmes delivered at the
5 Universities.
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List of Figures

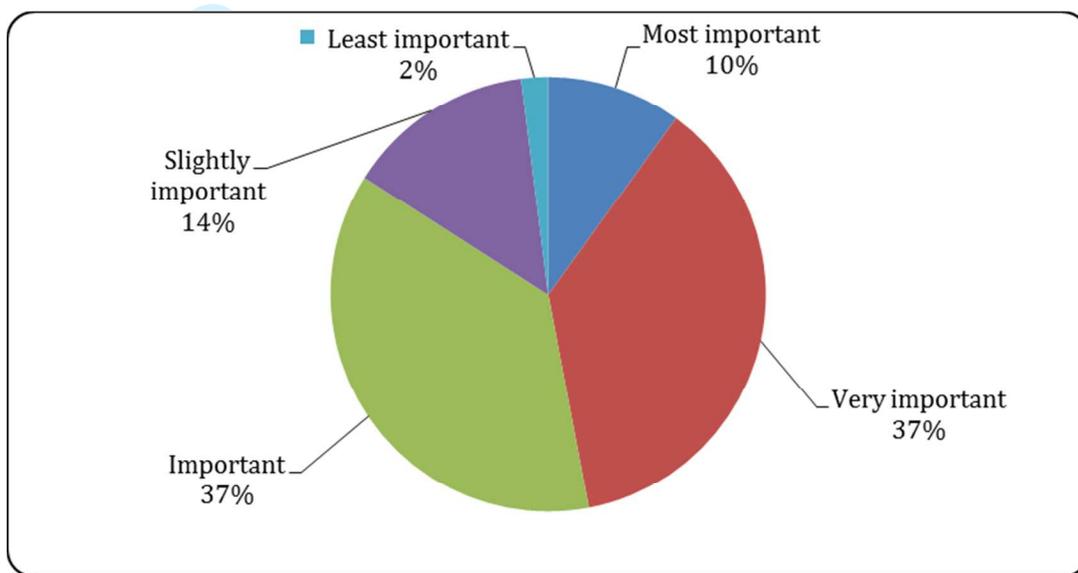


Figure 1 – *Level of importance of sustainability literacy to students*

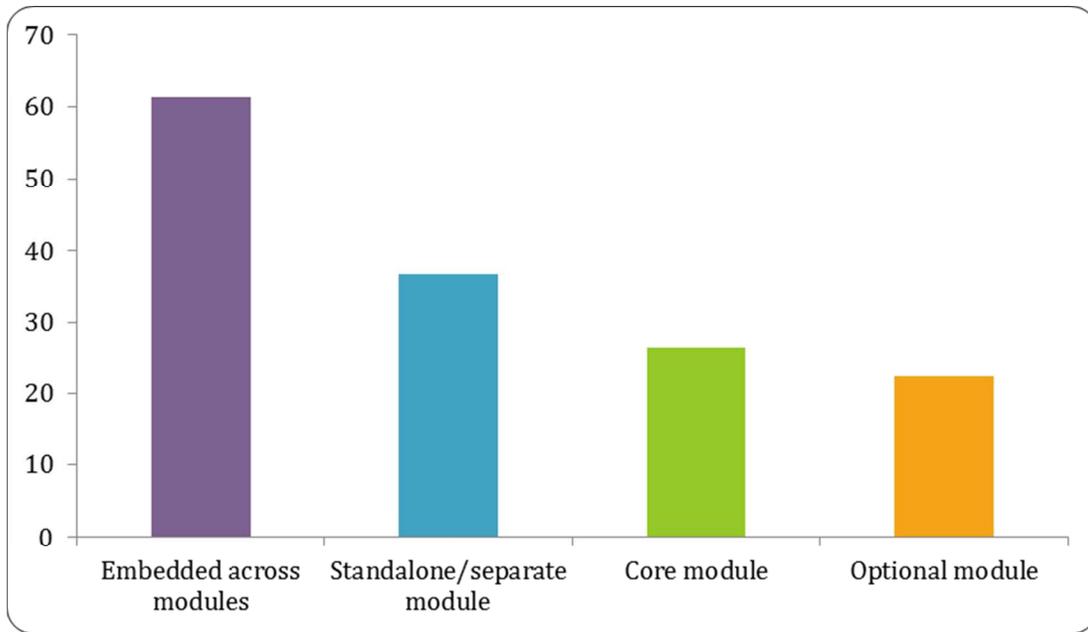


Figure 2- Approaches to the delivery of sustainability literacy

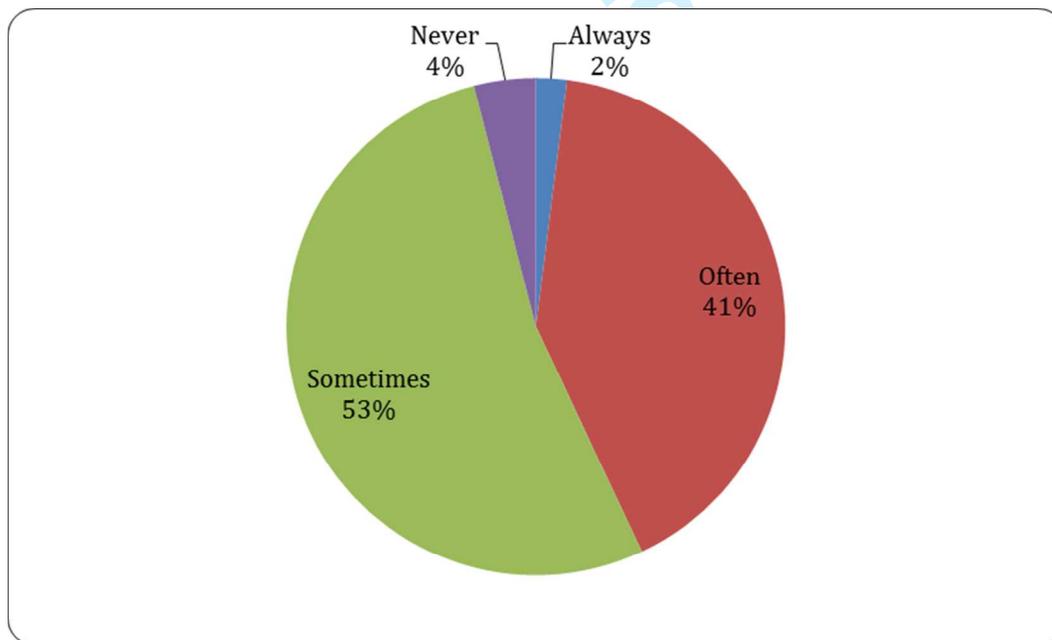


Figure 3 - How often sustainability literacy is delivered across the course

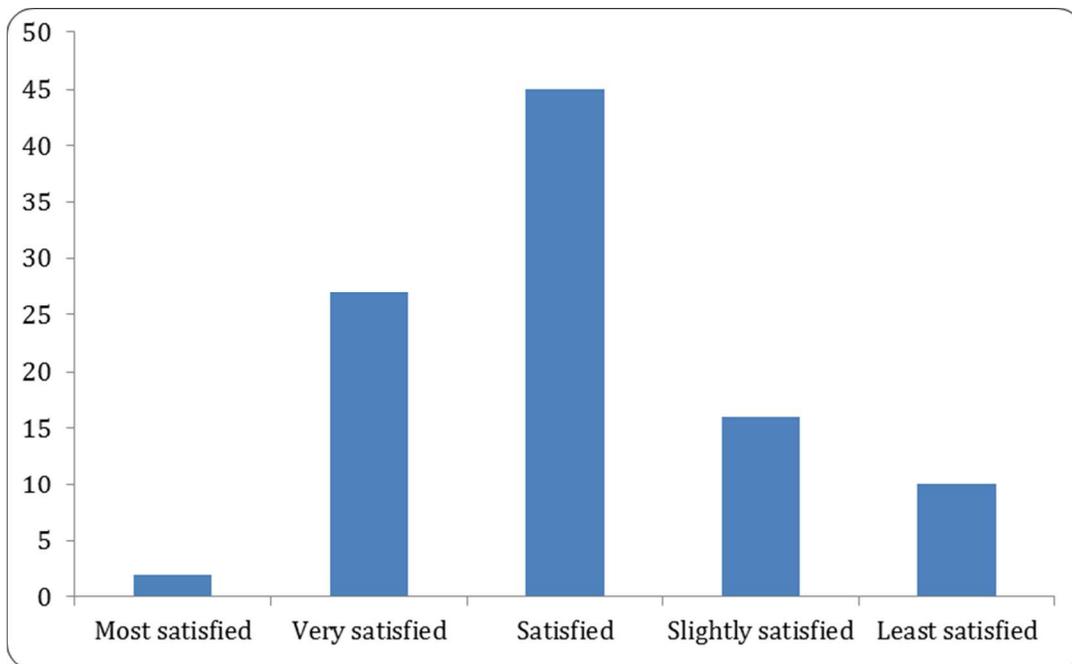


Figure 4 – *Students satisfaction on the extent of integration of sustainability literacy*

List of Tables

Table 1: MSc Quantity Surveying modules content analysis and Sustainable Development

Level	Module	Social sustainability	Economic Sustainability	Environmental Sustainability
	<i>Core Modules</i>			
6	Measurement, Documentation & Estimating			
6	Construction			✓
6	Institutional & Legal Context for Construction			
7	Economics & Finance for Construction			
7	Procurement & Management of Construction			✓
7	Construction Contract Administration			
7	Construction Law			
7	Project Evaluation	✓	✓	✓
7	Dissertation			
	<i>Optional Modules</i>			
7	Advanced Measurement & Documentation			
7	Building Control			✓
7	International Real Estate & Construction			
7	Legal Resolution of Property & Construction Disputes			
7	BIM & Collaborative Working	✓	✓	✓

Table 2: Profile of students who were interviewed

Student	Study Route	Gender
A	Part time	Male
B	Full time	Female
C	Part time	Female
D	Full time	Male
E	Part time	Female
F	Full time	Female
G	Full Time	Female
H	Part time	Male
I	Full time	Male
J	Part time	Female
K	Part time	Male
L	Full time	Male
M	Full time	Female
N	Part time	Male
O	Part time	Male

**Embedding sustainability literacy in a Built Environment programme:
Students perspective-Manuscript ID UICE-2016-0978**

Note:

The whole paper has been proofread and reviewed, on the major changes has been highlighted but the whole paper has been revised.

Authors' response

Reviewer	Comments	Authors' response
Reviewer #1	Positive comments only	No comment required
Reviewer #2	<p>#1. Edit this paper for grammatical, spelling, and punctuation issues</p> <p>#2. I think the questions and the responses in your study were misleading and inconclusive. It may have had more significance if you had asked the students <u>if they felt sustainability was an important topic</u>, whether it should be included in classes as modules</p>	<p>Done</p> <p>This question was asked and addressed in both qualitative and quantitative data analysis. Figure 1 shows the results of the importance of sustainability literacy to students and their career</p>
Reviewer #3	<p>#1. Currently the paper is somewhat narrow in focus and so the authors are encouraged to consider offering some knowledge as to what is happening in graduate level education in the built environment so as to set the context for this research.</p> <p>#2. The research approach needs to be strengthened in terms of reporting, as does the research analysis.</p> <p>#3. The title would be improved if the context of the research was shared.</p> <p>#4. The abstract should be reviewed to include a sentence or two to justify the research and why it is important to the education community to read about this research.</p> <p>#5. The acronyms used in the abstract should be written out in full on the first appearance.</p> <p>#6. The sections on education for sustainable development and delivering education for sustainable</p>	<p>This paper is for a special issue with restriction of a maximum of 13 pages. In addition the paper focuses on a postgraduate programme.</p> <p>Additional information added but within the page numbers restrictions</p> <p>Paper title revised</p> <p>The abstract has been revised but not much be added since the abstract is limited to 200 word max.</p> <p>Done</p> <p>Additional literature has been added</p>

	<p>development need to go from the broad focus and then on to the narrower focus of built environment and then QS.</p> <p>#7. Currently there is a disconnect/gap that would merit a review and updating. This will then allow the authors to make a stronger case for the need for this mixed methods research.</p> <p>#8. The research analysis section could be stronger and more in-depth. Currently this section is weak and provides little in terms of findings to support the aim of the research</p>	<p>Revised with additional information but too much information will go beyond the 13 pages limit</p> <p>The aim of the paper and the section has been reviewed</p>
Reviewer #4	<p>#1. The survey results indicate that the students desire more coverage of sustainability in their programs of study. From Table 1 and the student comments, there appears to be little coverage in the curriculum of social and economic sustainability</p> <p>#2. Provide recommended solutions to the issues identified. Recommend that the author address what level of sustainability should be included in the curriculum and what specific sustainability student learning outcomes should be adopted.</p>	<p>This was the outcome of the study...a recommendation has been added to the conclusion that curriculum designer should consider all the three dimensions of sustainability</p> <p>Recommendation has been provided on the best approach to integrate sustainability in the curriculum but details on developing learning outcomes are beyond the scope of this study</p>
Reviewer #5	<p>#1. The paper lacks depth and technical soundness. The findings of the research are applicable to the specific graduate program and hard to generalize.</p> <p>#2. The paper does not present any specific plan that can help academicians to teach the topic of sustainability (or sustainable development) in their graduate and undergraduate education programs. The paper only presents the students' perspective.</p> <p>#3. The design and construction industry perspectives are also important to see the full picture.</p> <p>#4. The research study did not</p>	<p>The paper has been reviewed with a clear aim and additional literature. This findings can be generalised to other similar built environment courses</p> <p>The aim of this paper is to provide students perspective on the importance of sustainability literature and how well it has been embedded in the course. How to teach is beyond the scope of this research due to the restriction of 13 pages max pages</p> <p>This paper concentrates on construction students perspective</p> <p>The use of both part-time and full-time help</p>

	<p>distinguish between full-time and part-time students. Typically, the part-time students are employed in the industry and their views and perspective on sustainability could be very different from the full-time students.</p> <p>#5. They may consider performing a mapping analysis between students' perspective and industry demands to determine the appropriate topics that should be taught and their placement in the program.</p> <p>#6. The research may present a framework for introducing the sustainability theme at various levels within the graduate programs.</p>	<p>provides diverse students views. Table 2 provides a profile of the students</p> <p>This is beyond the scope of this research due to the restriction of 13 pages max pages</p> <p>Developing a framework is beyond the scope of this research due to the restriction of 13 pages max pages. However recommendations has been given on how to integrate sustainability literacy</p>
Reviewer #6	<p>#1.The abstract and introduction are a little broken in their wording and so would benefit from a rewrite</p> <p>#2. The aim is also a little awkward and so would benefit from greater definition and a focus on a contribution to knowledge that is original</p> <p>#3. There are grammatical mistakes that require correcting - particularly in the abstract and aim</p> <p>#4. The phrase "youth of today" requires changing</p> <p>#5. The method should be more sharply focused on the approach taken and reason for its selection</p> <p>#6. The content analysis of the course content is a little weak, with a very simple characterisation of sustainability. What is the educational content / process used on the course, for example it would be interesting to use a theoretical lens such as Bloom's Taxonomy as a means to define if it is attitude, skills or knowledge that is being taught.</p>	<p>A review has been done on these sections</p> <p>The aim has been revised</p> <p>A proofreading has been done</p> <p>Changed</p> <p>Reviewed has been done</p> <p>The paper has a clear aim which is to investigate student's perspective on the importance of sustainability literature and how well it has been embedded in the course.</p>

	<p>#7. You do not pull out the implication of the work or state your unique opinion / contribution against the literature. As such there is a need for a strong and robust discussion that provides a bridge back to the original literature and strengthens the theoretical contribution of the article.</p> <p>#8. The conclusion does not full draw together the findings and does not describe the implications of the study against the aim.</p> <p>#9. Also, albeit a small point, the numbering in brackets in the first paragraph is unnecessary and a little distracting from the content.</p> <p>#10. There is a need for a stronger articulation of the aim and the introduction of some strong early definitions of the term "integration" and "embedded". As it is these terms are not described and justified full.</p> <p>#11. There are a number of educational learning concepts that might also support the contribution to knowledge made by this paper in and around this definition - specifically the ideal of "constructive alignment" between all parts of the educational, industrial and policy systems and "threshold concepts" that allow students to learn what is a very hard to understand concept across multiple modules.</p> <p>#12. Include a discussion section that combines the analysis of all three sections and returns again to the literature. Perhaps also add additional literature to this discussion that shapes and contributes to knowledge borrowing from fields outside of the narrow Education for Sustainable Development (ESD) field.</p>	<p>More has been added to the conclusion on contribution</p> <p>The aim has been revised and well linked to the conclusions</p> <p>Changes done</p> <p>Aim reviewed and the two terms explained</p> <p>These are outside the scope of the paper</p> <p>Though a separate section has not been provided, more information has been added to literature review, analysis and discussion and conclusion sections</p>
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