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ARTICLE

Designing a Rubric to Measure Elements of Transformative Learning in Online Learning: A Case Study of a FutureLearn MOOC

Nicola Beer

This study evaluates a two-week MOOC delivered on FutureLearn as part of an MSc in Nursing accredited by Coventry University to establish whether learners are demonstrating transformative learning. Evaluation is in the form of a rubric which is designed using Mezirow's theory of Transformative Learning as a theoretical framework, alongside the activity types used to inform design of FutureLearn courses.

The literature review finds that there is a gap in the research in evaluating for-credit MOOCs against the intended educational aims of the accrediting institution. The rubric created for this research attempts to fill that gap, by providing a means to evaluate both student learning and learning design.

The rubric identifies that the learners on this course are demonstrating elements of transformative learning at the lower levels of Mezirow's seven stages of critical reflection. Although the rubric was designed with the aim of evaluating MOOCs, it can be applied to any online learning experience that includes student engagement, either written or spoken. The paper makes recommendations for future developments and further research.

Keywords: Transformative learning; MOOCs; Online learning; Distance learning; FutureLearn

Introduction

The purpose of this study is to investigate whether platforms designed for the delivery of Massive Open Online Courses (MOOCs) can be used effectively to deliver postgraduate degrees that provide a learning experience aligning with the educational aims of the accrediting institution. Specifically, this research will evaluate a two-week open course (MOOC) in *Healthcare Research* delivered by Coventry University on the FutureLearn platform as part of their online MSc Nursing degree. It will attempt to measure the extent of transformative learning experienced by learners on this course, in sympathy with Coventry University's educational strategy which is strongly focussed on the provision of transformative learning experiences (Coventry University, 2015).

Literature Review

The literature review aims to expand on the key areas informing this research, namely: the accreditation of MOOCs, the current discourse around learning analytics and the evaluation of MOOCs, and previous attempts to measure transformative learning.

This is not a systematic literature review, the literature available on MOOCs being extensive, rather it attempts to summarise the state of the research, identify key papers and highlight the gap within which this research is located.

The literature was gathered by searching educational databases, namely: ERIC, British Education Index and Educational Abstracts.

MOOCs and accredited learning

MOOCs are by their very nature *massive* and *open to all.* That is, they are usually free, intended to be taken by hundreds, if not thousands of students, and they have no admissions policy: they require no prior educational attainment, although they may strongly recommend it (McAuley et al., 2010). Some argue that these factors have the benefit of opening up higher education to new markets, in particular to those who may not be able to afford a traditional university course (Dillahunt, Wang and Teasley, 2014) but others believe it raises issues of quality and difficulty in assessing student learning (Eaton, 2012; Kaplan and Haenlein, 2016; Macleod, Haywood and Woodgate, 2015).

The large number of students on a course makes tutor intervention at an individual level impractical, if not impossible and therefore MOOCs employ a variety of computer-marked assessments and peer-review activities to assess students' learning (Admiraal, Huisman and Pilli, 2015; Chauhan, 2014). These methods are recognised as having limited rigour (Daradoumis, Xhafa and Caballé, 2013), which may leave institutions reluctant to provide

Lancaster University, GB
n.beer@lancaster.ac.uk

official accreditation of MOOC learning, as they could be risking their reputation for no financial gain (McAuley et al., 2010).

This typical MOOC model then is problematic, in that the people who would benefit most from the free learning opportunity; those who cannot afford or otherwise access traditional higher education, have no incentive to participate as they receive no formal acknowledgment of their learning. Without accreditation, the value of a MOOC is limited, irrespective of the prestige of the institution behind it. This is characterised by the fact that most learners on MOOCs tend to be older, well-educated and studying for interest (Liyanagunawardena, Lundqvist and Williams, 2015; Macleod et al., 2015).

There have been attempts to address this issue, with MOOC platforms providing paid-for options to learners, in exchange for credit or recognition of learning. The way that this is carried out has been classified into four categories (Sandeen, 2013).

The first is *credit recognition,* whereby individual universities and colleges accept the completion of a MOOC, accompanied by an assessment given by the university for credit (Sandeen, 2013).

Content licensing involves universities licensing MOOC content for use in their own campus-based courses, eligible for credit in that institution.

Reciprocal arrangements are as yet fairly unexplored but this model would allow institutions to accept MOOCs from other institutions for degree credit. This would enable learners to effectively study for a degree at a number of institutions, and to pick and choose content from those universities that specialise in that subject (Sandeen, 2013).

An alternative model is *recognition of prior learning.* Coursera, EdX and FutureLearn now offer learners the opportunity to 'upgrade' for a small fee, earning them a certificate of participation, which does not comprise formal academic credit, but may be accepted as acceptable for credit transfer at some universities (Sandeen, 2013; Walton, 2017). This model sees those students who have paid learning alongside (and having the same experience as) those who have not. Other platforms, such as Udacity have moved almost entirely to a paid model, which allows learners to build up learning from short courses at a relatively cheap price to demonstrate a 'specialisation' or even a degree (Coursera, 2017; Hyman, 2013).

It is worth noting that a key feature in three out of four of the means of accreditation described above involve the accrediting institution providing an additional assessment beyond what is available in the MOOC. This can be seen as reactionary to the literature, which is cautionary about the rigour of MOOC assessment, particularly given its lack of tutor involvement (DeMars, Bashkov and Socha, 2013; Eaton, 2012; Sandeen, 2013). However, whilst these additional assessments in accredited courses and degrees provide the rigour required, there is no evidence in the literature to show that they are being evaluated. What we find is that the focus on using accreditation is as a means to improve student retention on MOOCs, asserting that it provides a better student experience (Chauhan, 2014), rather than assessing whether the accreditation leads to high quality courses.

A fifth alternative to these is the 'Small Private Online Course' (SPOC) model, pioneered by Harvard University (Coughlan, 2013). This model is the precursor to the degrees now being offered, in that they were courses offered via MOOC platforms, but to a closed cohort of students who were pre-selected, having been required to pass an admissions process.

Many MOOC platforms are now offering degrees: to date, FutureLearn, Coursera, EdX and Udacity but these are in a limited number of subjects, from a small number of institutions. This is a relatively recent venture, with the first MOOC degree being offered in 2013 (and a long wait for the second in 2015) (Shah, 2017), yet there has been time for a more thorough review of these degrees that doesn't seem to have happened. The academic discourse around MOOCs continues to talk about disruption and the integration of MOOCs into existing face-to-face courses, ignoring the embracing of MOOCs as a means to deliver a fully accredited Masters programme.

Evaluation of MOOCs and the use of learning analytics

Learning analytics can be defined as "the measurement, collection, analysis and reporting of data about the progress of learners and the contexts in which learning takes place" (Lester et al., 2017).

Learning analytics is a huge trend in educational research. A 2015 review (Gašević, Dawson and Siemens) of the trending direction of MOOC research found that studies using learning analytics methods were more likely to attract funding. Given their digital nature, MOOCs are rich in data gathering opportunities. Equally, it is comparatively more difficult in a MOOC than a face-to-face course to interview a student and as such it is hardly surprising that there is a glut of studies that apply the use of learning analytics to MOOCs (Ezen-Can et al., 2015; Liyanagunawardena et al., 2015). However, the literature is found to focus heavily on two areas: the progress of learners, with a particular interest in motivation, retention and predicting when students are likely to drop out (Alario-Hoyos et al., 2016; de Barba, Kennedy and Ainley, 2016; Drachsler and Kalz, 2016), and the social context in which learning takes place (evaluation of learner discussion) (Liyanagunawardena et al., 2013).

These are noble and interesting topics, but they put the focus on *learner experience* rather than *learner outcome*. Recent research relating to online learning at the Open University (outside the MOOC environment) suggests that there is not necessarily a relationship between how satisfied students are with a course and their achievement (Li et al., 2017). For a MOOC, the university may well want to focus on providing the best learner experience as the course acts as an advertisement for their institution. However, when it comes to full degrees, student experience is important, but needs to be balanced by student outcomes. Therefore, evaluation of MOOC degree courses needs to take a more holistic approach (Gašević et al., 2015).

Another increasing trend in MOOC research is the use of learner comments, a method that this paper is also employing. The predominant pedagogical underpinning of cMOOC platforms is that of either social constructivism or networked learning (Britain and Liber, 1999; Guàrdia, Maina and Sangrà, 2013), placing great emphasis on the knowledge that learners build together, through discussion. There is a growing literature utilising learner comments in order to evaluate the extent to which students are participating in social learning and the effectiveness of this (Alario-Hoyos et al., 2016; Ezen-Can et al., 2015; Goggins et al., 2016; Liyanagunawardena et al., 2015).

There is absolutely potential for learning analytics to measure the quality of learning, focussing on whether students are achieving stated learning outcomes. Indeed, a 2015 review of the literature on MOOCs and Quality (Hayes, 2015), which you would expect to address this very issue, is in fact largely devoted to research on student completion rates and student engagement, with only a short section devoted to "Good learning and learning design." The growing body of literature utilising learner comments provides a useful backdrop on which to develop the rubric to measure not social learning, but transformative learning.

Research context and problem

Universities in the UK and globally have begun to develop online degrees, delivered via popular MOOC platforms such as FutureLearn and Coursera, rather than using their established Virtual Learning Environments (VLEs).

Coventry University is the first UK university to deliver degrees via the FutureLearn platform (MacPherson, 2017) although Deakin University and Murdoch University in Australia have already produced a number of online degree programmes in partnership with the platform (FutureLearn, 2018b). The Open University has also announced its intention to deliver degrees via the platform (FutureLearn, 2018a) in addition to their already substantial online degree offering delivered via Moodle, and The University of London recently committed to providing an online BSc via the Coursera platform, (Steve Coughlan, 2018) joining Coursera's growing degree offering (Coursera, 2018).

MOOC platforms such as FutureLearn, Coursera and EdX are specifically designed for the delivery of educational content, but not necessarily to the depth and rigour required of degree-level teaching and assessment. Indeed, the platforms tend to have their own pedagogical aims that place restrictions on how content can be delivered (Sharples, 2018). This means that there are naturally challenges to be overcome in working with the functionality available and also in assessing the quality and effectiveness of learning materials.

By contrast, VLEs tend to be highly customisable, with the ability to deliver learning content in a variety of formats, in addition to handling assessments; providing collaborative tools; and integrating with university systems. They also frequently enable a large number of third-party widgets that further extend their capabilities (Beard, 2017; Britain and Liber, 1999; Derboven, Geerts and De Grooff, 2017; Weller, 2007). Despite the availability of a functional VLE, and possibly in reaction to research which indicates that VLEs are to a large extent under-utilised, nor particularly user friendly (Derboven et al., 2017), a small number of institutions are taking a risk and opting to provide degree programmes delivered through MOOC platforms.

Despite the enthusiastic take-up, it is as yet untested whether MOOC platforms with their comparatively limited functionality can be successfully used to deliver degree programmes that are in keeping with the ethos and educational strategy of the awarding university. Current research into the evaluation of MOOCs will be explored in more detail in the literature review.

This paper intends to start filling that gap by evaluating the extent to which the learning experience of students on the online version of Coventry University's MSc Nursing degree, delivered via FutureLearn, aligns with the educational aims of the university. The method of evaluation is the design and application of a rubric, developed to assess the level of transformative learning experienced by learners on the MOOC. It makes use of readily available data in the form of learner comments posted in discussion throughout the course. This enables the rubric to be adapted and applied to later courses, without the need to acquire additional data, for example via interviews or surveys. It also intends to identify which activity types within the course provoke the most effective transformative learning experiences in order to inform learning design going forward.

It is hoped that the rubric, although limited in its scope to evaluating a particular ethos of learning, will be adaptable to fit alternative educational aims. This would enable institutions to readily evaluate their courses and provide them with data that informs the design of future courses.

Research Questions

- **RQ1:** To what extent do students respond to the different activity types in an accredited FutureLearn MOOC on healthcare research in ways that indicate that they are experiencing transformative learning in their social interactions?
- **RQ1a:** What are the stages of transformative learning that are evident in students' online contributions?
- **RQ1b:** Which activity types are associated with the greatest evidence of transformative learning?

Theoretical Framework

The theoretical framework underpinning the design of the rubric is Transformative Learning theory, developed by Mezirow (1978, 1994, 1997, 1998, 2003, 2008), supported by the FutureLearn pedagogical aims.

Transformative learning will inform the design of the rubric, whilst design features of the FutureLearn platform will provide codes for the data analysis.

Transformative Learning

Transformative learning has been chosen as a framework primarily because it features prominently in Coventry University's education strategy as a key aspiration for their learning and teaching (Coventry University, 2015).

Therefore, any teaching delivered by the university, including that delivered via FutureLearn, ought to be providing opportunities for transformative learning.

However, the aspiration for transformative learning is not unique to Coventry University, with a number of other UK higher education institutions referencing it in their own education strategies (e.g. Aston University, 2013; Birkbeck University of London, 2012; Birmingham University, 2015). Using transformative learning as the framework, rather than Coventry University's broader education strategy, allows this research to be more widely adapted for use by other institutions. It also provides a more objective measure of effectiveness by which to assess courses and therefore to benchmark Coventry University courses against those provided by other institutions.

Mezirow's Transformative Learning theory is a theory of adult learning which states that students are able to change their beliefs, perspectives or understanding through a process of experiencing a 'disorienting dilemma' and resolving this through reflection and discussion (Mezirow, 2003). The relevance of transformative learning to adults is another key feature of its suitability for assessing online learning, as students who opt to undertake an online degree tend to be for the most part mature students, many of whom are working alongside their study (Torres and Eberle, 2010).

The theory has evolved over many years however its key tenets are that the process begins with a disorienting dilemma, and is characterised by critical reflection. Mezirow (1998) argued that "learning to think for oneself involves becoming critically reflective of assumptions and participating in discourse to validate beliefs, intentions, values and feelings".

Transformative learning as recognised through critical reflection can be described as a seven-stage sequence (**Table 1**).

These seven stages are based on Mezirow's (1994) revision of his original (1978) ten stage process.

The stages provide a graded means with which to recognise the extent to which learners are experiencing transformative learning. Therefore, these stages will provide the basis for the rubric, with each learner's comments being assessed for elements of critical reflection against the stages. This will enable RQ1 and RQ1a to be addressed.

Measuring transformative learning

Although it is acknowledged that it is difficult to measure transformative learning, it has been attempted previously (Lee and Brett, 2015; Springfield, Gwozdek and Smiler, 2015; Walvoord, 2016). However, previous measures have involved time intensive methods such as focus groups and the creation of questionnaires or surveys. In reality, when it comes to part-time distance students, such as those on Coventry University's online courses, conducting such research is unlikely to result in a high response rate and cannot be used on a regular basis to evaluate all courses.

The method employed by this paper of creating a rubric allows for a non-intrusive data collection method that can be utilised in any course. It also has the advantage of measuring transformative learning in the course itself, whereas the use of questionnaires and focus groups by their nature involve asking students questions that do not form part of their course and may prompt reflections that they

Table 1: The seven stages of transformative learning with description and examples.

Stage	Description	Example of comment
1. A disorienting dilemma	An experience that does not fit with a person's expectations. This cannot be resolved without the person changing their view of the world.	"I thought that…but…" "My experience has been different…" "This happened and now…"
2. Self-examination of affect	Realisation of one's feelings about the dilemma (usually feelings of shame or guilt).	"I feel [emotion] that I thought this"
3. Critical assessment of assumptions	Identification and analysis of limiting assumption e.g. what does it mean to you to feel this?	"As a nurse working in x country, I need to think in a certain way." "It is important to me that…"
4. Exploration of new roles	Beginning to think about how this could be different.	"If I am more aware of patients' values I will be better able to." "I am considering acting in this new way."
5. Planning a course of action	Identifying what is preventing change, analysing the dangers/benefits of staying the same/changing.	"I tried to find a way of acting in this new way." "It will be difficult for me to go against the norm." "I need to do x otherwise."
6. Acquiring knowledge and skills for implementation	Identifying what you need to know/ accomplish/overcome for change to occur.	"I would like to investigate further." "When I graduate…" "I gathered this information."
7. Trying out new roles	Actively making change.	"I have had x experience, which made me realise my view had changed."

would otherwise not have experienced. If transformative learning is realised through the act of critical reflection (Mezirow, 1994) then a more accurate measure of the extent of transformative learning should utilse reflection opportunities designed into the course, rather than use retrospective reflective questions that are additional to the course. This is particularly true for an online course with limited tutor interaction, where reflection needs to built-in rather than relying on ad hoc intervention from a tutor.

FutureLearn

FutureLearn is a pedagogy-informed learning platform that is explicitly designed to support a particular theory of how best to teach and the way that people learn (Sharples, 2018). The ethos behind FutureLearn is the power of social learning, with the platform being developed to enable learners to engage in frequent social interactions and to benefit from the learning that this enables.

FutureLearn requires courses delivered on the platform to subscribe to three key principles (Sharples, 2018):

1. Telling stories
2. Provoking conversation
3. Celebrating progress

The heart of these three principles is *provoking conversation,* based on Diana Laurillard's (1999) Conversational Framework. In their adaptation of Laurillard's framework, FutureLearn encourage the design of courses using a range of activity types that facilitate conversation between learners on a number of levels. Those activity types can be facilitated on the platform by a number of 'step types' as illustrated in **Table 2**.

No matter what the 'step type' or content, learners are able to join in with the conversation directly, using the comments facility at the bottom of every screen. By placing the conversation directly where the learning is taking place, rather than in a separate discussion forum, as is common in VLEs, learners are able to remain embedded in the context of the discussion and educators are able to design the learning journey to support learners' conversations (Min Chua et al., 2017).

In order to identify which activity types are associated with the greatest evidence of transformative learning (RQ1b), it is necessary to identify the type of activity that provoked each learner comment. Therefore, the rubric results will not be analysed in isolation, but will be accompanied by activity/step type categories.

Methodology

Research paradigm

A rubric is "a set of criteria specifying the characteristics of an outcome and the levels of achievement in each characteristic" (Odden, 2017). Rubrics allow for a direct measure of learning that is consistent in its evaluation. Use of a rubric is a pragmatist, mixed methods approach to research that provides both qualitative descriptions of student learning and quantitative data that objectively measures the extent of student learning. It also provides consistent evaluation and helps to refine practice.

Research site

Coventry University

This research is focussed on a two-week short course *Healthcare Research: For Healthcare Professionals* provided by Coventry University. The course is freely available to any learner via the FutureLearn platform, however it also forms part of their online, MSc Nursing degree, also delivered via the FutureLearn platform. Learners on *Healthcare Research* therefore comprise both members of the public, who are not paying for their learning, and fee-paying Coventry University students, who will continue their study with a number of closed courses, also delivered by FutureLearn and not available to non-fee-payers.

The course aims to harness the pedagogical underpinnings of the FutureLearn platform in order to deliver a

Table 2: FutureLearn activity and step types.

Activity type	Step type	Conversation
Read, watch, listen	Article, Video, Audio	Learners take part in conversation around a shared medium. They are encouraged to solve problems relating to the learning content and ask questions.
Discuss	Discussion	Learners are prompted to take part in conversation about their understanding so far and address deeper questions in pursuit of knowledge acquisition.
Collaborate	Article, Discussion	Work with other learners to construct a shared understanding and/or create an artefact.
Practice	Article, Discussion	Learners have the opportunity to discuss their experience.
Investigate	Article, Discussion	Learners have the opportunity to share what they have discovered and discuss with their fellow learners.
Produce	Article, Discussion, Video, Audio, Peer Review	Learners produce an artefact, using what they have learned.
Assessment	Quiz, Test, Peer Review	Internal conversations learners have with themselves when reflecting on quiz questions or peer review feedback.

learning experience that reflects the educational aims of Coventry University as outlined in their Education Strategy (Coventry University 2015). In particular, this strategy highlights the importance of transformative learning experiences through the medium of experiential learning, accompanied by an intercultural and international curriculum.

Healthcare Research is ideally placed to provide learners with the opportunity to experience a 'disorienting dilemma'. It is actively trying to expose students to different research paradigms, asking them to identify their own view of the world and how that impacts their research.

The course run evaluated in this paper is *Healthcare Research: For Healthcare Professionals,* available to learners 22 January 2018 to 21 February 2018. In total there were 1160 learners, of whom 208 (29.8%) were categorised as 'social learners' (learners who have posted a comment on at least one step).

Method: Rubric design and analysis

The design of the rubric itself is simply based upon the seven stages of transformative learning, derived by Mezirow (1994). Each data point (learner comment) was coded accordingly in three ways:

1. Is the learner demonstrating critical reflection?
2. Does the reflection indicate transformative change? If so, which stage of transformative learning does the comment indicate they have reached?
3. What activity type has prompted this learner comment?

The seven stages

To support coding of the stage of transformative learning, a description and examples of each stage were produced (**Table 1**). This is intended to reduce subjective decision making by coders.

Using the rubric

Once the rubric was designed, the next steps were to extract the data, code it and analyse it. In this instance, the data used was the learner comments from the *Healthcare Research* course, but the rubric could be used with any open-ended, free-response data for example output from focus groups, interviews or surveys.

There was a total of 923 unique comments on the *Healthcare Research* course, posted by 193 learners. Due to the time constraints of the project, a random sampling of 97 learners was undertaken, resulting in 502 comments.

The FutureLearn data can be exported in a CSV file for analysis in Excel. It automatically assigns each learner a unique ID and attributes each comment to the step where it was made. By categorising each step on the course to one or more of the activity types (illustrated in **Table 2**) it is possible to quickly identify the activity type that prompted each learner comment. For ease of analysis, a brief summary of what learners were asked to do on each step, plus any discussion prompts were added to the spreadsheet. The data was grouped by learner and ordered by step number so that it was possible to see how learners' comments changed as they progressed through the course.

It was found that context was necessary to provide accurate coding. For example, on a step where learners are asked how their views have changed, learners may internalise the preamble and their comment might only describe their views now, with no reference to what they felt previously. By knowing what was asked, and being able to see their previous comments it is possible to more accurately assess whether a learner has experienced a transformation and to what extent.

Only one stage of transformative learning was coded per unique comment. If a comment illustrated that a learner had addressed two or more stages, then only the 'highest' stage was coded.

Validity and reliability

The rubric was evaluated using a meta rubric (Stevens and Levi, 2004) to test its validity. The objectivity of the rubric was also tested by a second coder, confirming inter-rater reliability at 70% agreement.

It is acknowledged that transformative learning has its critics, largely centring on what is considered an over-reliance on Habermas' social philosophy, and the limitation of application of the theory to self-directed adult learners, who Mezirow considers to be aware of the constraints on learning (Collard and Law, 1989). However, this paper is not concerned with the validity of it as a theory nor the debate surrounding it. It takes the assumption that Coventry University applied a critical approach to theories of learning when designing its educational strategy and made the best choice to fit their ethos. The paper therefore accepts that this is the chosen educational aspiration of Coventry University (and others) and works to apply it.

Ethical concerns and limitations

This research utilises comments available on an open course. In order to preserve anonymity, and in accordance with FutureLearn's privacy policy, no learner comments have been directly quoted in this paper.

This research is proof-of-concept, limited to one two-week course (equivalent to circa 20 hours of learning). Given the nature of transformative learning, it is likely that a longer time frame is needed to provide learners with more opportunity to critically reflect and experience changes in point of view and habit of mind. Additionally, a two-week period cannot be fully representative of a Masters degree programme. However, the aim of this research is purely to test the rubric, and to provide a course measure that can be used with effect on courses of any length, thus maximising its usefulness.

As data becomes available for courses comprising the remainder of the degree programme, it would be advisable to extend the use of the rubric to cover whole modules and, eventually, whole degrees. It will be of particular interest to note whether the results are replicable in closed courses, which will have a much lower number of enrolled learners and therefore less discussion.

Findings

Instances of transformative learning

In total, 503 comments from 97 learners were analysed. Of those 503 comments, 132 (26.24%) illustrated some level of transformative learning, as illustrated in **Figure 1**. Over half (57.58%) of these comments demonstrated transformative learning at Stage 1, that is: the student had experienced a disorienting dilemma but had not yet moved beyond this stage.

The next highest stage represented was Stage 3 (Critical assessment of assumptions) at 18.9%. Stage 2 (Critical assessment of assumptions) was evident in 9.09% of comments; Stage 4 (Exploration of new roles) was also found in 9.09% and Stage 5 (Planning a course of action) in 5.3% of comments. There were no instances of Stage 6 (Acquiring knowledge and skills for implementation), although Stage 7 was represented by 2.27% of comments.

Of the 97 learners, just over half (55.7%) experienced some stage of transformative learning.

Learning types

This two week course comprised 37 learning steps that can be categorised into the different activity types as illustrated in **Table 3**. Of these, 18 steps (48.6%) featured comments that illustrated instances of transformative learning in the sample comments.

This would suggest that steps where learners are directed to Read, Watch or Listen are the most successful at provoking a transformative learning response in learners. However, this does not take into account the level of transformative learning that is being expressed.

As **Figure 2** illustrates, Read, Watch, Listen (RWL) and Discuss steps were equally effective at eliciting comments demonstrating stage 1 of transformative learning, with RWL more effective at stages 4 and 5. By contrast, Discuss steps were more effective at provoking a reflection at stages 2, 3, 6 and 7. Discussion steps led to a response categorised at stage 2 or higher 65% of the time, whereas RWL steps provoked a response categorised at stage 2 or higher 56% of the time. Comparatively, Assessment and Investigate steps also have a higher success rate in provoking a response at stage 2 and 3, respectively.

Table 3: Activity types and transformative learning.

Activity type	Number of steps in course	Number of steps showing transformative learning in sample	Success rate
Read Watch Listen	12	8	67%
Discuss	17	8	47%
Investigate	3	1	33%
Assessment	2	1	50%
Practice	3	0	0%

Discussion and Conclusions

Learners often report in end-of-course surveys and feedback that the course has changed the way they think but without a means of demonstrating the ways in which they have been transformed, this is merely anecdotal evidence. Previous attempts to measure transformative learning in students have required the collection of extraneous data in the form of focus groups, (Stone et al., 2017) questionnaires (Springfield et al., 2015; Stone et al., 2017), field notes and learning journals (Lee and Brett, 2015). This paper sets out a rubric that allows for objective measurement of the extent of transformative learning experienced by learners on a MOOC. The rubric has been tested on a two-week open course, but it could be extended to longer courses, or indeed to measure student transformative experiences over several courses. Additionally, the use of the rubric is not limited to MOOCs. Although the structure of a FutureLearn MOOC was specifically used to aid in designing the rubric, it could be applied to any online course that invites free text commenting from students.

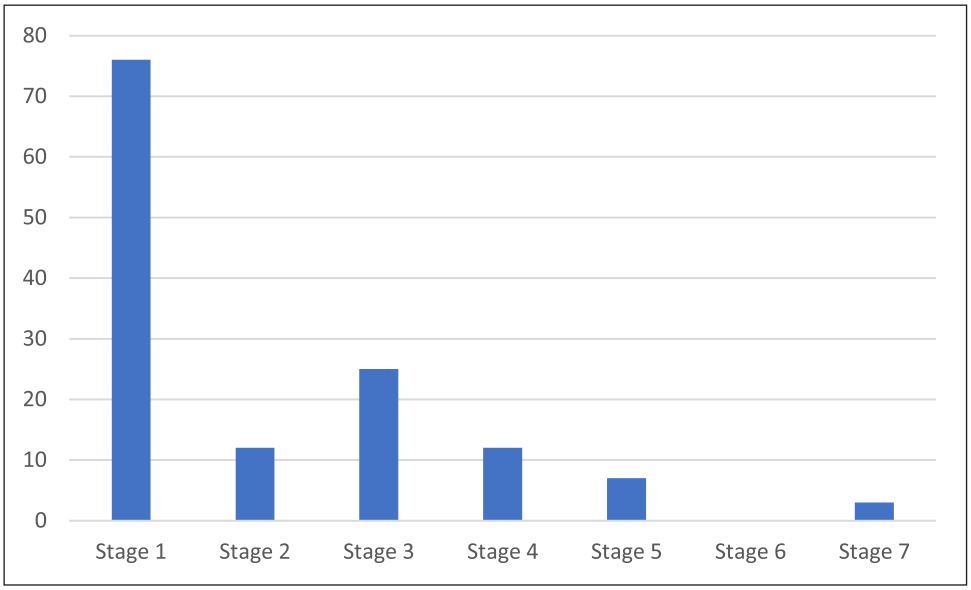

Figure 1: Comments illustrating transformative learning.

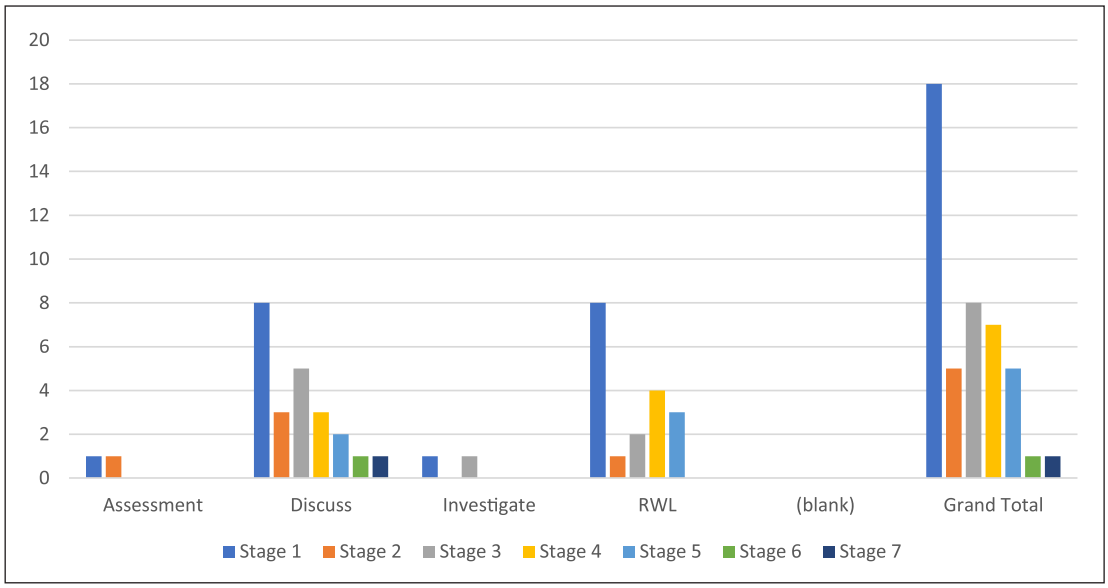

Figure 2: Instances of comments showing the different stages of transformative learning by activity type.

If the rubric were to be more widely used it would enable institutions with an ethos of transformational learning to measure and describe the effectiveness of their courses in meeting their educational aims. It also provides a means by which to identify activity types that are particularly successful at provoking critical reflection illustrating transformative learning, which can be used to shape learning design of future courses.

Given the nature of transformative learning as a process of critical reflection (Mezirow, 1978, 1994, 1998, 2003), a reasonable hypothesis could be that steps actively directing learners to discuss or reflect (Discussion steps) would prompt the greater transformative learning responses. What the rubric tells us, however, is that whilst the discussion steps do prompt the higher levels of transformative learning (level 2 and above), the assimilative RWL steps are almost as effective at the higher levels and actually more effective at prompting the disorienting dilemma (stage 1) in learners. It is particularly interesting to note that the reflection steps at the end of each week of the course did not illicit any reflections from learners in the sample that demonstrated a transformative learning response. By contrast, some of the RWL steps that are for the most part assimilative, not requiring learners to reflect, were reasonably effective at this. This result prompts a need for further research that utilises the rubric to identify 'successful' steps, then investigates the content of each step and associated task in order to better understand the relationship between step content and the evidence of transformative learning. It is of note that the step types, course structure and encouraged learning design process that shape a FutureLearn course enable easy identification of the different learning types employed within a course. The use of a variety of activity types is however common to any online course, so this research does not tell us anything about the effectiveness of a FutureLearn course over any other platform – it merely illustrates that this MOOC platform can indeed be used to deliver a programme that enables transformative learning.

It is also of note that comments indicated that learners were experiencing transformative learning at the higher levels of Mezirow's model, without previously demonstrating lower levels of transformation, or they appear to miss stages. Further research is required with learners to establish whether those stages are indeed occurring without being apparent in the comments, or if learners are simply progressing directly to later stages.

What is now required is more experimentation with the rubric to analyse a wide variety of courses, beginning with the second run of *Healthcare Research,* which has seen significant changes. Experimentation by a number of practitioners and researchers will assess the validity of the tool. Ideally, after the rubric has been tested on a number of programmes it would then be used to evaluate courses of much longer length, including modules and degree pathways.

Competing Interests

NB was employed as a learning designer at Coventry University during the data acquisition period for this study but had no input into the production of the 'Healthcare Research: For Healthcare Professionals' course.

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