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Online learning experiences of new versus continuing learners: a large scale replication study

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Online learning experiences of new versus continuing learners: a large scale replication study

A vast body of research has indicated the importance of distinguishing new versus continuing students' learning experiences in blended and online environments. Continuing learners may have developed learning and coping mechanisms for "surviving" in such learning environments, while new learners might still need to adjust their learning approaches to the new learning context. In this large scale replication study, we investigated whether and how the learning satisfaction experiences of 16670 new versus 99976 continuing students were different. Using logistical regression modelling of learner satisfaction scores of 422 undergraduate blended and online modules (including 232 learner and module learning design variables), our findings indicated that new learners indeed differed subtly in their learning and teaching experiences across two consecutive academic years. The minor differences in key drivers between the 2014 and 2015 cohorts also indicate that institutions need to continuously monitor and act upon changing learning needs.

Keywords: Online learning, learner satisfaction, learning design, logistical regression modelling.

Introduction

A vast body of research has indicated the importance of distinguishing new versus continuing students' learning experiences in blended and online environments. For example, previous research (Brinkworth et al. 2009; Franssen and Nijhuis 2011; Harvey, Drew, and Smith 2006) on first-year experiences of students on campus in higher education has indicated it may be important to distinguish the students' learning experiences at later years from their first year experience. The first six months of education are essential for academic and social integration, and have a strong impact whether students persist in higher education, or drop-out. For example, using hierarchical regressions of perceptions of tutors and actual student progression (Franssen and Nijhuis 2011) found significant relations between the perception of the tutor on the adjustment of 385 students and the actual student progress. In a comparison across nine universities in the Netherlands, the primary predictor whether students passed their first year was related to their academic integration (Rienties and Tempelaar 2013), and the extent to which they felt satisfied about their learning experience.

New students in our context are defined as those whom have not studied at the Open University UK (OU) before. The OU is the largest higher education provider of online distance education in Europe. It might be that someone is already a very successful learner with strong previous higher education qualifications, but each new learning environment and Virtual Learning Environment (VLE) in particular bring some challenges that need to be overcome by new learners (Sharples et al. 2015; Tempelaar, Rienties, and Giesbers 2015). *Continuing students*, defined in this study as those who have studied with the OU before for at least one module, also need to adjust their learning approach depending on the learning design of the next module, but at least they should be more familiar with the navigation of the VLE, where to find learning and peer support, and how the schedule their activities to meet the various deadlines (Calvert 2014; Li, Marsh, and Rienties 2016; Rienties and Toetenel 2016).

Previous research has found that continuing learners may have developed learning and coping mechanisms for “surviving” in online learning environments (Arbaugh 2014; Calvert 2014), while new learners might still need to adjust their learning approaches to the new learning context. Several recent predictive models seem to indicate that previous educational experience in particular (Calvert 2014; Tempelaar, Rienties, and Giesbers 2015) are good proxies for successful learning. Another reason for distinguishing new from continuing learners is that continuing learners may be more sensitive to (changes in) learning design choices for the next module they follow, as they have developed some coping mechanisms based upon previous learning design experience.

For example, in a recent study comparing the learning designs of 151 modules at the OU with how 111k students were engaging with the VLE and their academic performance, Rienties and Toetenel (2016) indeed found that students in their first year of study were more likely to fail than in later years. Furthermore, new students were relatively less engaged in the VLE (e.g., time spent per week) than more senior (continuing) students. In other words, successful completion of (parts of) modules and gaining credit will have an impact on these coping mechanisms (Calvert 2014), but at the same time might influence learners' perceptions about the learning design of a particular module.

Using logistical regression modelling, Li, Marsh, and Rienties (2016) analysed learner satisfaction data of 62,986 learners in 401 undergraduate blended and online modules, whereby the findings indicated that learning design (e.g., teaching materials, assessment strategies, workload) and long-term goals of learners (i.e., qualifications and relevance of modules with learners' professional careers) had a strong and significant impact on overall satisfaction. Building on Li, Marsh, and Rienties (2016), in this follow-up study we primarily focus on whether and how the learning satisfaction experiences between 16670 new and 99976 continuing students at the OU are indeed substantially different.

Using two years of consecutive data gathered amongst 116.646 students and 422 modules, and applying logistical regression modelling of 232 potential explanatory variables, we aim to unpack what the key drivers are for learner satisfaction for new versus continuing students. Not only is this conceptually an interesting exercise with a large, repeated study, but also it is very important to understand whether there are significant differences between new and continuing learners, as the OU learners' population has substantially changed in the past 5 years, whereby there are now more early career learners registered to study online and distance learning. Furthermore, differences in learning experience may have substantial design implications for instructional designers of online distance learner courses.

Unpacking the drivers for learner satisfaction for new and continuing students

A key concern for most higher education institutions and instructors and readers of this journal in particular is whether students, or learners in general, are satisfied with their learning experience (Kember and Ginns 2012; Onwuegbuzie et al. 2007; Marsh 1982; Coffey and Gibbs 2001; Moskal, Stein, and Golding 2015). Besides the obvious long-term advantages of having “satisfied customers”, who are more likely to return for follow-up education or who share their positive experiences with peers (Gu, Schweisfurth, and Day 2010), an increasing number of institutions are using student evaluation instruments to monitor and improve the teaching and learning experience (Arbaugh 2014; Eom, Wen, and Ashill 2006; Crews and Curtis 2011; Rienties 2014). In particular in the UK student evaluation scores are important, as higher educational institutions are ranked every year based upon learner satisfaction surveys, as measured by the National Student Survey (Callender, Ramsden, and Griggs 2014; Ashby, Richardson, and Woodley 2011). Substantial financial and reputational rewards can be reaped when higher education institutions are listening and acting upon what students say to improve their teaching and learning experience.

The analysis of learner satisfaction surveys allows teachers and managers to search for unobserved patterns and underlying information in learning processes (Arbaugh 2014; Rienties 2014). As early as 2004 research into student satisfaction (Entwistle and Peterson 2004) with learning was framed in terms of the investigation of the salient factors that contributed to powerful learning environments. This work highlighted a series of linked concepts which describe aspects of students’ experience in higher education that promote learning. These included students’ conceptions of learning, their orientations to learning and their motivation and attitude. Borden (1995) also states that student satisfaction is related to the match between student priorities and their respective learning environment. This is especially so for new students, as often the priorities change during the course of their studies (Li, Marsh, and Rienties 2016).

Understanding how students go about their studying and their orientations to their learning environment or even the learning design of their module, will affect their satisfaction rating (Eom, Wen, and Ashill 2006; Kember and Ginns 2012; Marsh 1982; Zerihun, Beishuizen, and Os 2012). It must be recognized however that student satisfaction ratings have two, potentially conflicting purposes (Crews and Curtis 2011; Rienties 2014). They are used on the one hand to attract new students and on the other hand are employed as a means to retain students through identifying student expectations which must be met by the university. This again raises the question about what are the salient variables within the educational experience that has the highest perceived importance for students. Hence, understanding new student satisfaction ratings becomes even more important, since the elements that attract students to a university are not necessarily the elements that are important in retaining them, and so managing expectations through learning design and assessment strategies maybe even more important than initially surmised in the early literature.

Using a structural equation model amongst 397 learners in the US following an online course, Eom, Wen, and Ashill (2006) found that learner satisfaction was a significant predictor for learning outcomes. Similarly, in an online MBA programme of 43 modules followed by 659 students, Marks, Sibley, and Arbaugh (2005) found that learning experience was significantly impacted by instructor-student interaction, followed by student-student interaction and student-content interaction. In a recent important study measuring which factors predicted learner satisfaction and academic performance amongst 48 MBA online and blended learning modules in the US, Arbaugh (2014) found that learners' behaviour, as measured by social presence, predicted learner satisfaction and academic performance. In contrast, the technological environment used in these 48 modules did not significantly predict learners' learning experience and performance. Therefore, Arbaugh (2014, 352) argued that "a resource-strapped business school may get the most 'bang for its buck' by allocating resources towards developing instructors when contemplating how best to support its online and blended offerings".

Building on the above research of learner satisfaction, learning design and practical availability of data sets of learner characteristics and learning designs at the OU, Li, Marsh, and Rienties (2016) have identified seven theoretical blocks of core constructs that may have an impact on overall learner satisfaction at the OU (see Figure 1). In particular, while several of the above studies primarily rely on self-report data, we were keen to include independently measured data about learner characteristics and module design. Two blocks are specifically related to the learning design, while four blocks are related to characteristics of learners, such as (previous/current) educational progress, demographics and concurrency. We will now discuss each block in turn.

➔ Insert Figure 1 about here

Block 1 Module design

A vast body of research has found that the module design and role of the instructor are essential for a good learning experience (Arbaugh 2014; Arbaugh and Duray 2002; Eom, Wen, and Ashill 2006; Marks, Sibley, and Arbaugh 2005; Sun et al. 2008; Rienties and Toetenel 2016). Furthermore, recent findings indicated that learning design is influenced by their disciplinary context (Marks, Sibley, and Arbaugh 2005; Rienties et al. 2012) and organisational culture (Rubin and Fernandes 2013). In particular, course structure and specific learning design elements, such as the types and frequency of assessment (Eom, Wen, and Ashill 2006; Sun et al. 2008), duration of the module (Calvert 2014), the level of the taught module (Rienties and Toetenel 2016), module size in terms of number of learners enrolled, has previously been found to have an influence on learning satisfaction.

Block 2 Presentation

A particular feature of many online and distance education programmes is that a module is presented at several time points during the year (Hess and Saxberg 2013). Although the overall blue-print of the respective module will be the same, instructors at the OU will be making subtle changes (e.g., timing of online assessments, question items) in learning design from presentation to presentation. Similarly, the composition of the tutors supporting groups of learners will most likely be slightly different. In line with Arbaugh (2014), beyond the overall module design it is important to take into consideration any subtle alterations in learning design and support in a particular presentation of a module.

Block 3 Learner characteristics

Several studies seem to indicate demographic and socio-economic factors nested within learners may have an impact on learning, such as previous educational experience (Calvert 2014; Tempelaar, Rienties, and Giesbers 2015), gender (Herman 2014; Arbaugh 2014; Arbaugh and Duray 2002), age (Ke and Xie 2009; Arbaugh and Duray 2002), ethnicity (Richardson 2012), social-economic status (Calvert 2014), and employment status (Littlejohn and Margaryan 2014). Furthermore, the motivation to study may be an important factor in learning and learning satisfaction in particular. Therefore, controlling for individual learner characteristics may be essential for understanding and unpacking the factors that drive learning satisfaction.

Block 4 Learner/module/presentation

Beyond the relatively stable individual learner characteristics described in block 3, for each module and presentation available the OU collects specific data about each learner. For example, academic retention and completion (Marks, Sibley, and Arbaugh 2005), study goals at the start of the presentation (Eom, Wen, and Ashill 2006), price area, Equivalent or Lower

Qualification (ELQ) status, whether the tuition fee is sponsored or not (Calvert 2014), may influence learners' perceptions about their learning experience.

Block 5 Learner history

As is the focus of this article, it may be important to recognise that there may be substantial differences in learning experiences between learners who start an online course for the first time, and those who have been studying online at a particular institution for some time (Arbaugh and Duray 2002; Arbaugh 2014).

Block 6 Concurrency

Given that most distance learners study part-time, there is substantial flexibility in the number of modules and credits that can be followed at any point in time (Arbaugh and Duray 2002; Eom, Wen, and Ashill 2006; Calvert 2014; Sun et al. 2008). While some learners may be very able to study various modules at the same time, for other learners concurrence of multiple modules might actually hamper their overall learning progress and learner satisfaction (Calvert 2014). Furthermore, some modules may have substantial learning synergies (e.g., similar disciplinary focus) or compatible assessment deadlines (e.g., assignment 1 in week 4 for module 1, while week 4 for module 2), while for other modules it may be more difficult to manage time effectively.

Block 7 SEAM learner satisfaction

Finally, overall learner satisfaction might be influenced by factors included in the learner satisfaction survey. In the past thirty years, the OU has consistently collected learner feedback to further improve the learning experience and learning designs. In line with other learner satisfaction instruments (Marsh 1982; Onwuegbuzie et al. 2007; Zerihun, Beishuizen, and Os 2012; Coffey and Gibbs 2001), at the OU the Student Experience on a Module survey (SEAM) questionnaire is implemented. For a full description of the instrument, we refer to previous work (Li, Marsh, and Rienties 2016).

Methodology

This study aims to explore the construct of learner satisfaction based on data collected via the SEAM questionnaire by using data collected at two consecutive academic years. If the patterns of the key drivers for new and continuing students across these two academic years are comparable, we can be more confident about the reliability and robustness of our findings. Learners were sent an invitation to participate two to three weeks before the end of the module. The surveyed learners of 2014 (n_{2014} = 62,986) were those who were on 401 modules in presentations that ended between 1st August 2013 and 31st July 2014, who had results available by 13th August 2014, while surveyed learners of 2015 were 376 (21 new in comparison to 2014) modules in presentations that ended between 1 July 2014 and 30 June 2015 (n_{2015} = 53,750). All learners regardless of their completion status were included (i.e., to control for non-response bias).

Dependent variable (Target variable)

In line with Sun et al. (2008) one dependent variable was used in the study: overall learner satisfaction (‘*Overall, I am satisfied with the quality of this module),* this variable was coded as a binary variable. Satisfied *(Definitely agree/agree)* was coded 1 and unsatisfied *(Definitely disagree/disagree/Neither agree nor disagree)* was coded 0. This is allowed us to use ‘target variable’ as a binary variable for our logistical regression.

Independent variables (Predictors)

Given the flexibility of OU study, learners from various backgrounds can choose very different paths and approaches for studying (Ashby, Richardson, and Woodley 2011; Calvert 2014; Richardson 2012). 232 variables related to studying at the OU were available, all of which could be potential predictors for overall learner satisfaction. These variables were split into seven blocks described earlier.

Data Analysis

The SAS Enterprise Guide 4.3 and SAS Enterprise Miner 6.2 software packages were used for data interrogation and analysis respectively. The data was cleaned for missing values and outliers. Missing values were an issue mainly for the survey questions, where data was missing it was identified as a valid category for the survey questions and included in the analysis. Each block of selected variables was modelled in groups for each model. A comprehensive descriptive analysis was conducted to discount variables that were unsuitable for satisfaction modelling. Potential multicollinearity was investigated and any highly correlated predictors were identified, and the most appropriate variables methodically selected in line with (exploratory and confirmatory) factor analyses and key driver analysis. Five factors were identified, namely instructional support, assessment, teaching materials, collaborative activities, and feedback on assessments. The variables that were statistically significant from each block were then combined and modelled to identify key predictors for the final model of learner satisfaction. The outliners were checked and removed if they were related with data entry errors or miscoding.

In line with previous studies (Agresti 1996; Hosmer and Lemeshow 2004) logistic regression analysis was then used to measure the degree of influence of the 7 blocks of predictors on learner satisfaction. The stepwise regression model procedure was applied to each block, and validation misclassification was used as the selection criterion when evaluating the step with the most optimum model solution. Stepwise selection begins with sequentially adding the independent variables with the smallest p-value below the entry cut-off ($p<0.05$). All included variables were evaluated based on the statistical significance criteria. The sequence terminated when all remaining variables had a p-value that was less than the pre-determined cut-off. The stepwise regression was conducted for all seven blocks to limit the number of variables in the final model. The logistic regression coefficients were interpreted by transforming the logit into an odds ratio (Borenstein et al. 2009). The odds ratio is the change in the odds of the outcome occurring. Multiple solutions were tested within each block, so the fit of the logistic regression models were assessed using the SAS

Miner model comparison node with Kolmogorov-Smirnov Goodness-of-Fit Tests. Two final models for predicting overall learner satisfaction were obtained for continuing and new learners respectively. In Figure 2, a visual representation of our methodological approach is provided.

➔ Insert Figure 2 about here

Results

Dataset 1 2014 continuing vs. new students

A first step to determine whether the learning experiences of new students were indeed significantly different from those whom were continuing students, we conducted ANOVAs for each of the five factor analysis scores. Indeed significant but small in size differences were found in terms of the five factors, whereby new students were significantly less positive about the learning experience than continuing students. In particular, instructional support ($F = 9.103$, $p < .001$, $\eta^2 = .003$), assessment ($F = 9.874$, $p < .001$, $\eta^2 = .003$), teaching materials ($F = 7.929$, $p < .001$, $\eta^2 = .003$), collaborative activities ($F = 4.668$, $p < .01$, $\eta^2 = .002$), and feedback on assessments ($F = 4.294$, $p < .01$, $\eta^2 = .001$) were significantly lower for new students.

As a second step, we conducted logistical regressions for both new and continuing students to unpack which key factors influenced their learning satisfaction, and whether these key factors were different for new and continuing students. In Table 1, the results indicated that for both new and continuing learners, their satisfaction with *teaching materials* provided on the module was the most important driver of their overall satisfaction. The learners who were less happy with quality of *teaching materials* (Q34) were 99% less likely to be satisfied with the overall quality of the module, compared to those who had positive feedback, whereby the difference was significant ($p < .001$). Learners' satisfaction with the *assessment on modules studied* (Q36) was the second most important driver for overall learner satisfaction. Learners who reported dissatisfaction with their assessment were 86% less likely to have positive overall learner satisfaction than those who had a much more positive experience of assessment.

The third most important factor for new students was satisfaction with *advice and guidance provided for studies on modules* (Q3), which was only the fifth key factor for continuing students. This difference might reflect that continuing students already have a clearer idea of the overall learning programme, while new students may need more markers and support. For both new and continuing students the fourth most important factor was the integration of materials (Q5).

Career relevance (Q14) was the fifth most important factor for new students, while for continuing students this was the sixth most important factor. Rather surprisingly, while for continuing students the overall qualification aims were the third most important factor for continuing students in terms of their learning satisfaction, this was only the sixth driver for new students. Continuing learners were 70% less likely to have positive overall learner satisfaction if the modules they studied did not contribute to the achievement of their wider qualification aim.

➔ **Insert Table 1 about here**

Another rather surprising difference between new and continuing students is that age was a significant factor, whereby older learners, especially those aged over 60, were 70% less likely to have positive overall learner satisfaction. In other words, specific attention should be given to new learners of a mature age that register for modules at the OU. Perhaps the fact that many of the courses and materials at the OU are provided online might be a negative factor influencing their experiences. For continuing learners age was not a significant factor, indicating that continuing older learners had developed coping mechanisms.

While only six factors significantly predicted learner satisfaction across the 401 modules for new students, nine additional factors influenced learning satisfaction for continuing students. Factors such as; helpfulness of tutor knowledge (Q23), clear assignment instructions (Q9) and completion of assignment (Q11), workload (Q35) and method of delivery of teaching materials and learning activities (Q6) were all important drivers for overall satisfaction for continuing students. This showed that learning design related factors had a significant impact on learners' overall satisfaction above and beyond learner or module related characteristics. Furthermore, improvement in learning design will help increase overall learner satisfaction.

As indicated at the bottom of Table 1, only a few module characteristics had a significant impact on overall learner satisfaction for continuing learners (but yet again not for new students), such as *module level*, *credits and exam component* and *progress of their planned life cycle*. Continuing learners studying relatively short 10 credits module were twice as likely to be satisfied with their learning compared to those studying for long and intensive 60 credit modules. Continuing learners studying at level one (i.e., year 1) were 15% less likely to be satisfied than their counterparts studying for other undergraduate levels. Continuing learners on modules that had portfolios as an examinable component were 59% less likely to have positive overall learner satisfaction than those modules with exams and projects. Continuing learners on newly developed modules, especially those on modules that were less than 25% of the way through the planned module life cycle, were 27% less likely to be satisfied with their overall learning experience. These variables had a significant impact on overall learner satisfaction. However, their importance was less pertinent than other learning design related variables.

Interestingly, none of the learners' characteristics (e.g., gender, age, ethnicity, prior education, performance) had an impact on overall learner satisfaction once learning design was included in the modelling for both new and continuing learners. For example, students' performance (pass/completion) was included in the modelling but the results indicated it was not an important driver for prediction of learner satisfaction. This indicates that no matter what the OU learner's background is, their overall learner satisfaction was mainly driven by module design and learning experience. These finding imply that a well-designed module may help to increase online satisfaction; regardless of the cohort background in terms of demographics as well as their previous learning experience.

Dataset 2 2015 continuing vs. new students

In order to confirm the reliability of the research design and validity of results of the 2014 dataset, the same method and analysis were repeated with the 2015 data. In general, the patterns identified in 2015 were very similar to those in the 2014 dataset, with again a key role of teaching materials, methods of delivery, and links to qualifications/career relevance in predicting learning satisfaction. Only a small number of items dropped or moved in terms of key factors influenced learner learning satisfaction, as indicated in Table 2.

- ➔ Insert Table 2 about here

As illustrated in Table 3, in comparison to 2014 the qualification aim moved up four places for new students in 2015, being the second most important factor for learning satisfaction. Furthermore, the method of delivery, which was not a significant key driver for new students in 2014, was important for new students in 2015. In addition, face-to-face tutorials were important to new students in 2015, while continuing students in 2015 found online tutor support important. Rather surprisingly, the third most important factor for students in 2014, advice and guidance, was no longer a significant factor for new students in 2015, and was only the tenth factor for continuing students. Similarly, Q36 Assessment was no longer a key driver for new and continuing students in 2015, although Q9 Assignment instructions a key driver. In other words, in general the key drivers for learning satisfaction were similar in 2014 and 2015, but with subtle differences for new and continuing students.

➔ Insert Table 3 about here

Discussion and Implication

For most institutions and teachers around the globe whether their students are satisfied with their learning experience is a key concern (Kember and Ginns 2012; Onwuegbuzie et al. 2007; Moskal, Stein, and Golding 2015). In a very competitive, global educational market place having satisfied "customers" is a key sustainable strategy for higher education institutions to keep investing and developing their teaching and learning practice. Building on our initial study (Li, Marsh, and Rienties 2016), this study specifically compared the learning experiences between 16670 new and 99976 continuing students in two consecutive academic years.

Our most important finding is that new students indeed have substantially different learning experiences than continuing students. In a competitive higher education market where it is essential to retain existing customers but also to attract new customers, our analysis indicate that higher educational institutions may need differentiation strategies to satisfy the needs of new and existing online learners.

For both new and continuing learners across the two academic years who were more satisfied with the quality of teaching materials, assessment strategies, and workload were significantly more satisfied with the overall learning experience. A vast body of research has highlighted that instructional design and quality of learning materials are crucial for an effective online learning experience (Arbaugh 2014; Sun et al. 2008; Crews and Curtis 2011; Stowell, Addison, and Smith 2011; Sharples et al. 2015). Furthermore, previous research (Hattie 2009; Ashby, Richardson, and Woodley 2011; Marks, Sibley, and Arbaugh 2005) has found that assessment and feedback strategies are important indicators for learning performance and learner satisfaction in particular. Although several articles published in this journal have recently focussed on student evaluation data with multiple modules (Stowell, Addison, and Smith 2011; Crews and Curtis 2011), we believe that we are the first to provide such a strong, robust evidence given the diversity and richness of 422 module designs, the size of our sample, the relatively stable results across the two academic years, and our ability to control for 232 variables in terms of individual learner characteristics and module learning design.

Another important finding is that individual learner characteristics did not play a more pronounced role in predicting overall learner satisfaction, except for age for new learners. Blocks 3-6 from Figure 1 seemed to have a limited impact on whether learners were satisfied with their learning experience. In a way, our findings are a positive encouragement for those instructional designers and instructors in blended and online courses, as learners are not necessarily negatively influenced by prior education and demographic background characteristics.

While most of the key drivers for learning satisfaction across the 2014 and 2015 cohort were similar, thereby verifying the initial study of Li, Marsh, and Rienties (2016), it is surprising that several key drivers for new students in 2014 were no longer significant for new students in 2015. Several interrelated factors might explain these differences. For example, due to strategic focus of OU management on retention in 2015, many module chairs may have adjusted their assessment policies, with clearer guidance and fewer assessments during the module. Similarly, with the increased focus on specific qualifications rather than so-called open degrees (i.e., broad degrees across the various disciplines selected by students based upon their interests) at the OU, most faculties and departments have started to restructure the various qualifications in 2015. In addition, with the increased financial pressures for students (i.e., lower government subsidies), new students in 2015 may be more focussed on obtaining a clearly defined qualification linked to their own career (Woodall, Hiller, and Resnick 2012; Simpson 2013). Also the preference of face-2-face tutorials for new students in 2015 relative to online tutorials for continuing students might indicate different learning needs, and thus a need for institutions to consider diversified learning paths for new and continuing students.

This analysis has evaluated learner satisfaction data in order to inform principles of good practice in learning design. The robustness of these findings are supported by the size of the data sets being considered. Key to this methodology is the consideration of how learning design impacts on learner satisfaction, and in particular provides guidance to module teams in terms of what they could focus on in order to improve learning outcomes. The subtle differences between the 2014 and 2015 cohort also indicate that institutions need to continuously monitor and act upon changing learning needs, in line with recent learning analytics studies (Tempelaar, Rienties, and Giesbers 2015; Rienties and Toetenel 2016).

Limitations and future research

A first and obvious limitation of our research is that several of the items of the SEAM survey loaded heavily on overall learner satisfaction. This may be considered as an artefact, as a result of the fact that learners were completing the respective surveys and these items at one point in time, whereby other individual learner characteristics and learning design proxies were measured independently at different time intervals. Nonetheless, our findings do indicate that not all 40 items strongly predicted overall learner satisfaction, and most items not related to learning design and professional careers were dropped in our logistical regression modelling. Furthermore, several Block 1-2 variables did significantly predict learner satisfaction over time. Second, the predictors associated with learning design were based upon learners' self-perceptions, with inevitable self-reporting bias issues. Third, our data was inherently hierarchical in nature (Rubin and Fernandes 2013), but in our current analyses all variables were entered at a one level. Given the large sample size of respondents, including the relative and absolute academic performance, and the wider variety of modules we included in our modelling, we argue that the focus on learner satisfaction is justified. It is a widely accepted in marketing and business that satisfied customers are more likely to continue buying new products and services. Finally, as this study was conducted within one higher education institution, we encourage researchers to use our logistical regression modelling approach in order to test, verify and contrast whether similar key drivers for learner satisfaction are present within their own context.

Conclusion

Our findings indicate that learning design parameters (i.e., assessment, career focus, teaching materials, workload) have a strong impact on overall learner satisfaction. More importantly, new learners seemed to experience the learning environment in a slightly different manner than continuing students. A next step in our research is to identify the optimal balance and interactions between these learning design activities for new and continuing students, and how we can visualise the impact of these learning design activities to both instructional designers, instructors, and new and continuing learners.

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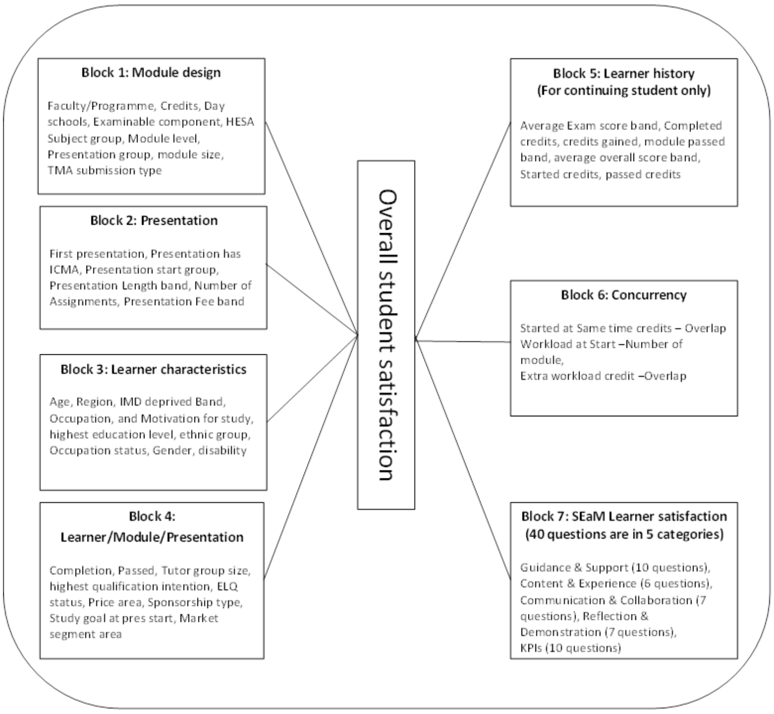

Figure 1 Overall learning satisfaction (Source: Li, Marsh, and Rienties (2016)) [1]

[1] HESA: Higher Education Statistics Agency; iCMA: Interactive Computer Marked Assessment; IMD deprived band: The Index of Multiple Deprivation is a UK government qualitative study of deprived areas in English local councils; ELQ: Equivalent of Lower Qualification; KPIs: Key Performance Indicators.

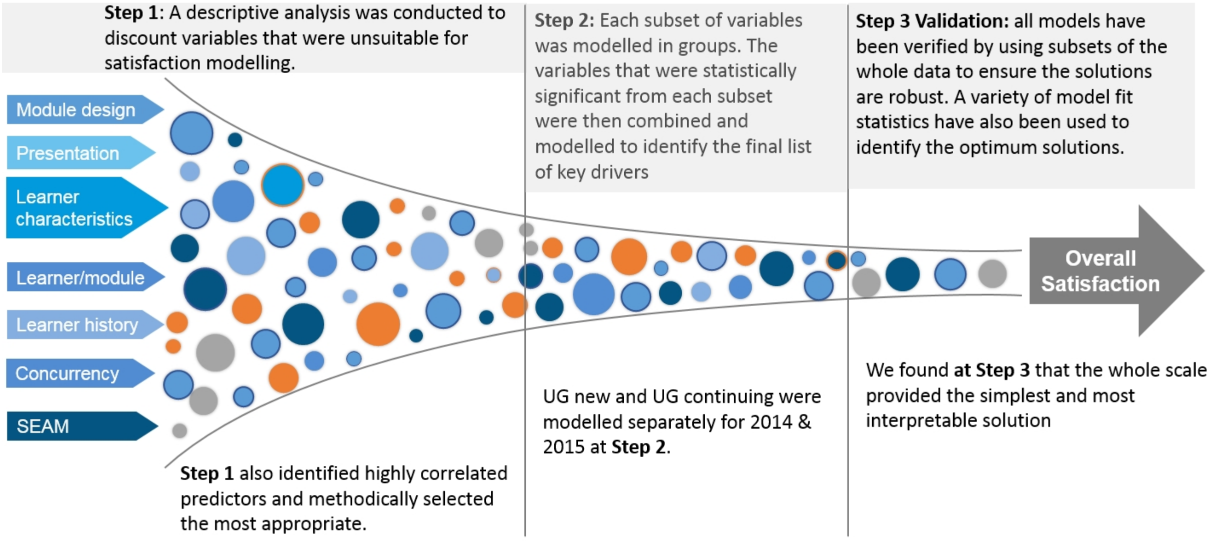

Figure 2 Data Analysis Flow

(Definitely disagree vs. Definitely agree)	New		Continue	
	Wald x2	Odds Ratio	Wald x2	Odds Ratio
Q34 Teaching materials	102.629***	.014	864.465***	.014
Q36 Assessment	46.398***	.061	224.998***	.136
Q3 Advice & guidance	34.982***	.190	66.488***	.331
Q5 Integration of materials	27.803***	.373	89.979***	.308
Q14 Career relevance	20.647***	.985	38.702***	.544
Q13 Qualification aim	17.521*	.143	114.658***	.296
Age (Over 60s vs Under 21)	15.188***	.303		
Q23 Tutor knowledge			38.167***	.530
Q9 Assignment instructions			37.591***	1.008
Q11 Assignment completion			36.198***	.669
Q35 Workload			31.396***	.478
Q6 Method of delivery			24.196***	.678
Module credits (10 vs 60)			17.37**	1.878
Module level (Level 1 vs others)			11.946*	.854
Module exam component (Portfolio vs others)			11.423*	.411
% of planned module life cycle (25% less vs others)			10.603*	.726

*** p < .001, ** p <.01, * p < .05

Table 1 Predicting new vs. continuing learners overall learner satisfaction (2013/2014 academic year)

(Definitely disagree vs. Definitely agree)	New		Continue	
	Wald x2	Odds Ratio	Wald x2	Odds Ratio
Q34 Teaching materials	118.913***	.017	765.332***	0.19
Q13 Qualification aim	102.072**	.091	327.556***	.239
Q6 Method of delivery	78.679***	.221	79.534***	.257
Q20: Attendance of face-to-face tutorials	65.993***	.243		
Q9 Assignment instructions	34.661***	.156	66.978***	.135
Q14 Career relevance	24.576***	.632	78.651***	.443
Q5 Integration of materials	19.149***	.384	86.756***	.276
Age (Over 60s vs Under 21)	14.284**	.352		
Q3 Advice & guidance			35.109***	.492
Q11 Assignment completion			76.554***	.669
Q35 Workload			65.996***	1.211
Q23 Tutor knowledge			25.939***	.362
Module credits (10 vs 60)			14.745**	1.452
Module level (Level 1 vs others)			13.692*	.389
Q22 Tutors' online support			35.396*	.821

*** $p < .001$, ** $p < .01$, * $p < .05$

Table 2 Predicting new vs. continuing learners overall learner satisfaction (2014/2015 academic year)

	2013/2014		2014/2015	
	New	Continuing	New	Continuing
Q34 Teaching materials	1	1	1	1
Q36 Assessment	2	2		
Q3 Advice & guidance	3	5		10
Q5 Integration of materials	4	4	7	3
Q14 Career relevance	5	6	6	5
Q13 Qualification aim	6	3	2	2
Age (Over 60s vs Under 21)	7		8	
Q23 Tutor knowledge		7		11
Q9 Assignment instructions		8	5	7
Q11 Assignment completion		9		6
Q35 Workload		10		8
Q6 Method of delivery		11	3	4
Module credits (10 vs 60)		12		12
Module level (Level 1 vs others)		13		13
Module exam component (Portfolio vs others)		14		
% of planned module life cycle (25% less vs others)		15		
Q20: Attendance of face-to-face tutorials			4	
Q22 Tutors' online support				9

Table 3 Ranking of key drivers of overall learner satisfaction for new vs. continuing learners (2014 vs. 2015)