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Research article

Understanding satisfaction essentials of E-learning in higher education: A multi-generational cohort perspective

David Eshun Yawson^{a,*}, Fred Amofa Yamoah^b^a Business School, Ghana Institute of Management and Public Administration (GIMPA), P.O. Box AH 50, Achimota, Accra, Ghana^b Department of Management, Birkbeck University of London, Malet Street, Bloomsbury, London WC1E 7HX, UK

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ABSTRACT

Despite the increasingly critical role of e-learning in higher education, there is limited understanding of the satisfaction essentials of multi-generational students' cohorts undertaking online courses. In this study, we examine the perceived value of educational experiences of multi-generational students' cohorts studying via an online learning management system (Moodle). The study analysed survey responses from multi-generational students (N = 611) on a core subject in an undergraduate business school programme. The results show that Generations X, Y and Z students produce different students' satisfaction levels in distinct components of the online programme; namely, course design, course delivery, course delivery environment and preference of the mode of delivery. Generations cohorts account for remarkable effects in the total satisfaction of students on the online learning programme. The results suggest that contextualising online teaching based on multi-generational students' cohort composition could be one strategy to enhance student learning experience and satisfaction.

1. Introduction

The advances in the application of technology to improve and innovate have affected all industries and management education would not be exempted from it. In Higher Education (HE), current global developments requiring studying and teaching from home, due to global restrictions of movement of human beings have accelerated the drive of the application of online learning globally. However, this new drive and attended implementation of online learning have necessitated the deployment of online learning systems in shorter implementation times. Thus, leaving critical multi-generational stakeholder satisfaction essentials barely interrogated. Specifically, the emerging multi-generational students' satisfaction essentials in E-Learning Management Systems for an undergraduate Business School curriculum. In this study, we define stakeholder student satisfaction as "the perceived value of one's educational experiences in an online educational system" (Astin, 1993; Horvat et al., 2015). This paper, therefore, seeks to bring to the fore important imperatives on students' satisfaction emanating from the gender and more importantly the current multi-generational undergraduate cohorts found in the traditional undergraduate business management programmes (Sun et al., 2008; Andrade et al., 2020).

Nicholson (2007) posits that E-learning (*used interchangeably with online learning*) has evolved in different ways in Business, Management and Education, and currently means quite different things in different sectors. Campbell (2004) identified that, in the education sector, 'E-Leaning' refers to the use of both software-based and online learning. Whereas, in Business and Management and it refers solely to a range of online practices. The application of technology in design, delivery and management of undergraduate business and management programmes is now a global trend. As education gravitates towards flexible education, and associated teaching towards blended and flip learning environment (Dahlstrom et al., 2014; Barr and Tagg, 1995). Therefore, necessitating the evaluation of these systems is vital to ensure successful delivery, effective use, and positive impacts on learners.

Horvat et al. (2015) copiously argued that in Higher Education, the emerging trend of blended learning is the intentional integration of traditional (i.e. face-to-face) learning and online learning to provide educational opportunities and maximize the benefits of each platform to effectively facilitate student learning. They argue that it offers students flexibility, as well as convenience. In course design, they further argued that it is an approach that upholds the combination of different times and places for learning which offers the conveniences of fully online courses without the complete loss of traditional (face-to-face) contact resulting in

* Corresponding author.

E-mail address: dyawson@gimpa.edu.gh (D.E. Yawson).

more robust educational experience than either traditional or fully online learning. This evolution has however been accelerated by current happenings in the global environment.

Learning management systems (LMS) are web-based, cloud-based or installed software which assists in the teaching and learning process, helping ineffective delivery of instruction, management and development. As internet technology advances, more application programs are now web or cloud-based. The next generation of LMS is projected to be open, personal, social, flexible, support learning analytics, and properly support the move to mobile computing (Stone and Zheng, 2014). Other prevalent names in higher education, which are used interchangeably in place of Learning Management System (LMS) are Personal Learning environment (PLE), Course Management System (CMS), Virtual Learning Environment (VLE), and E-Learning Courseware (Chaubey and Bhattachary, 2015).

Higher Education is changing very rapidly and trying to meet the needs of the very diverse stakeholders which includes instructors, learners and administrators. There is, however, a parallel change in the diversity of learners, the ultimate recipients of the learning. Therefore, making it imperative to understand their satisfaction essentials to improve learning and maximize the design objectives of the courses. Al-Fraihat et al. (2020) have argued that significant amount of research in e-learning has advanced our understanding of user success factors of e-learning, such as information quality, service quality, satisfaction, usefulness and system quality. Furthermore, earlier studies focus on the intention to use, adoption, usability, course contents and customization were found by Cidral et al. (2018), which evolved later to include satisfaction from 2007. This later proceeded to studies that focused on the overall success of e-learning and on how students' characteristics affect e-learning. Al-Fraihat et al. (2020) posits that, earlier studies were concerned more with the technology and that with increased reliability and accessibility, recent research has refocused more on students' and instructors' attitudes and interactions, which play a vital role in e-learning. However, research on e-learning has generally ignored the synergistic effects of the success characteristics of interacting together (Eom and Ashill, 2018). Furthermore, Horvat et al. (2015) had argued that there is a contention of a gender divide in the use of internet online learning and also satisfaction levels are higher in "combined learning" group than traditional learning group.

This study, therefore, seeks to examine student's satisfaction essentials by looking at the effects of the elements of student satisfaction on online learning in the context of the learner's characteristics of gender and the emerging concepts of multi-generational cohorts in the traditional undergraduate degree-awarding programmes. This paper contributes to the current literature on elements of quality characteristics of students' satisfaction effects on e-learning in three ways: Firstly, the study suggests the differences in students' satisfaction of elements of quality of e-learning driven by gender factors. Secondly, we establish that differences in students' satisfaction of elements of quality of e-learning based on age generations are shown to be marked by the social categorisations of Generations X, Y and Z that produces a different inter-generational learning environment with distinct characteristics. Thirdly, we establish that undergraduate multi-generational cohorts contextualise students' satisfaction of elements of quality of e-learning in their usage of e-learning based curricula. Fourthly, we further show that student satisfaction in e-learning delivered courses is likely to improve when different inter-generational learning environments with distinct characteristics are factored into programme development, delivery and assessment.

The rest of the paper is organized as follows; the existing literature; the research questions and hypotheses are presented. Then the methodology, in particular, the sample; the design; method; procedure and the instrument used to gather evidence are elaborated upon. Finally, the empirical results are presented and discussed; and the paper concludes by highlighting its theoretical and practical implications; limitations of the research and future research.

2. Literature review

A significant amount of research has been advanced in the area of e-learning which has increased understanding in terms of the essential success- factors of e-learning such as system quality, satisfaction, usefulness, information and service quality (Al-Fraihat et al., 2020; Stickney et al., 2019; Keržič et al., 2019; Umek et al., 2017; Umek et al., 2015). There has been past research on the subject including the focus on the intention to use, adopt, usability, course content and customization (Damjanovic et al., 2015; Cidral et al., 2008). This gradually developed to include the overall success of e-learning and how students' characteristics affect it. Past research has been concerned with technology but with increased reliability and accessibility, the current focus has been more on student instructor's attitudes and interactions which plays a pivotal role in e-learning (Al-Fraihat et al., 2020; Stickney et al., 2019; Scutelnicu et al., 2019; Nicholson 2007). It is worth noting however that research on e-learning has ignored the combined-effects of the interaction of success variables (Eom and Ashill, 2018; Raspopovic et al., 2014), identities and characteristics of users (Sandeen, 2008; Seters et al., 2012; Williams, Matt & O'Reilly, 2014). We, therefore, proceed to review the literature on e-learning based on satisfactory models, gender, e-learning, multi-generational students' (Generations X, Y and Z) satisfaction characteristics towards e-learning in the subsequent sections.

2.1. E-learning and E-learning satisfaction based on satisfaction models

There is difficulty with having a consensual definition of e-learning due to the continuous development in the field of technology (Chaubey and Bhattachary, 2015; Stone and Zheng, 2014; Nicholson, 2007). E-learning systems have been defined in several ways in different disciplines and have been defined more recently as a web-based or cloud-based software program which assists in teaching, learning process and ineffective delivery of instruction, training and development programs (Chaubey and Bhattachary, 2015; Lee et al., 2011) Al-Fraihat et al. (2020, p.68) have also defined e-learning system as "an information system that can integrate a wide variety of instructional materials (via audio, video, and text mediums) conveyed through e-mail, live chat sessions, online discussions, forums, quizzes, and assignments". Generally, an e-learning system is an information system that integrates the activities of both human (learners, instructors and administrators) and non-human entities (learning management systems) for meaningful educational intercourse (Andrade et al., 2020; Stickney et al., 2019; Horvat et al., 2015; Damjanovic et al., 2015).

Further, Stone and Zheng (2014) posit that a Learning Management System (LMS) is a centralized web-based information system where learning content is managed and activities organized. This, therefore, makes it urgent to investigate the multiple dimensions of the e-learning systems, especially satisfaction concerning all stakeholders. In a most recent review of literature on e-learning by Al-Fraihat et al. (2020), four categories of measuring success were outlined to be; Studies based on the 1) DeLone and McLean information systems success model; 2) Technology Acceptance Model (TAM); 3) User Satisfaction Models, and 4) E-Learning Quality Models.

In a review by (Al-Fraihat et al., 2020, p.69), it was reported that the concept of user satisfaction in assessing information systems success was originated by Cyert & March (1963). In that review, it was suggested that if information systems meet users' needs, their satisfaction automatically increases. Besides, systems usage is hindered by lower satisfaction levels (Thong and Yap, 1996), making the user satisfaction factor a critical one to information systems success. Thus, research has found user satisfaction as an important measure of information systems success (Andrade et al., 2020). Not only is satisfaction an imperative measure of success but also of effectiveness, usage and acceptance of information systems (Sun et al., 2008). Due to the constant evolution of technology, numerous learning systems under different categorisations have developed among which are Personal Learning environment (PLE), Course Management System

(CMS), Virtual Learning Environment (VLE), and E-Learning Courseware. In the past years, open-sourced networks such as Moodle had gained global appeal and acceptance in higher education. [Chaubey and Bhat-tachary \(2015; p.160\)](#) in the history of the LMS reiterated the different categories of LMS based on usage and accessibility as:

Open Source Learning Management System-The open-source LMSs are learning management platforms which are available under a public free license, providing users with the rights to use, to change, to study, to create and to distribute the results, free of charge, to anyone and for any purpose. MOODLE, SAKAY etc. are the most popular names in this category.

SAAS/Cloud-Based Learning Management System. Cloud-based learning management comes with cloud computing features and delivers education online to any student at anytime and anywhere around the world. The 'MUST' requirements to be fulfilled being an internet connection and a tool (i.e., computer, tablet, smartphone). Digital Chalk, Docebo SaaS LMS, Talent LMS, Firmware LMS, Litmos LMS, etc. are some famous names in this category.

Proprietary Learning Management System-These systems have been licensed by their developers under the legal rights belonging to the copyright owner/s. Design2Leran, ANGEL (property of Blackboard Inc.) are the popular ones in this category. [Stone and Zheng \(2014\)](#) listed some of the providers to include Coursera, Udacity, and EdX though there remain numerous providers due to the global popularity of these learning platforms.

2.2. E-learning satisfaction characteristics of social categories of generations

The concept of Generations has been discussed vastly by extant literature from three different perspectives ([Franz and Scheunpflug, 2016](#)) i. e. genealogical, pedagogical and historical-sociological perspectives. In this study, we choose to review Generations from the historical-sociological perspective which refers to different groups in a society. Generation is a cohort of people born within a particular period with an interval of 20 years ([Sandeen, 2008](#)), which [Kupperschmidt \(2000\)](#) in the historical-sociological vein defined as an 'identifiable group that shares birth years, age location, and significant life events at critical developmental stages' (p. 66). [Strauss and Howe \(1991\)](#), posits that it is a social categorization which offers people an easy and a safer sense of personality identification than any other social category. There is a distinct difference among generations which is recognized as "peer personality" ([Howe and Strauss, 2000](#)). This peer personality is also termed as generational persona which is a distinct human factor embodying distinct attitudes about family life, gender roles, institutions, politics, religion, culture, lifestyle and the future ([Howe and Strauss, 2000, p.40](#)).

[Srinivasan \(2012\)](#) posits that these differences occur because of major influences in the environment within which early human socialisation occurs which impact the development of personality. Knowing more about this peer personality might lead to developing and delivering effective educational programs ([Sandeen, 2008](#)) to ensure user satisfaction.

The characteristics of generations and their effects have been a major point of research for business and management professionals especially marketers ([Giunta 2017](#)). [Srinivasan \(2012, p.52\)](#) noted that most inter-generational studies have focused on work and life-related values; motivators; professional growth; attitudes to rules; authority and hierarchy; attitudes to learning, training and development, and work environment. Nonetheless, not much research has been done to examine the multi-generational effects on business education. [Williams et al. \(2014\)](#), recounts that students construct knowledge by organizing and making meaning out of their experiences which takes place in the context of their evolving assumptions about knowledge ([Baxter Magolda, 1999, p.6](#)). Through these experiences of self-authorship of knowledge ([Kolb and](#)

[Kolb, 2005 p.209](#)), each generational group differs from the other generation. Several categories of generations have been used by demographers, marketers and psychologists making the field of study very unclear ([Hole et al., 2010; Sandeen, 2008; Howe and Strauss, 2003](#)). However, for this study, we concentrate on the following categorizations; Generation X (1965–1979), Generation Y (1980–1995), and Generation Z (1996–2003) ([Giunta, 2017; Edelman/Strategy One, 2010; Wendover, 2002](#)).

The three generations are all prevailing in the current undergraduate programmes and their categorization guides to set markers for Generation Z to minimize any overlapping of generational markers in the field of generational studies. From literature, these generational categories have been known to have specific characteristics in orientation ([McCuskey, 2020; Selingo, 2018; Sandeen, 2008](#)) which applies to this study. [Sandeen \(2008; pp.12–19\)](#) observed the following characteristics of the birth generations:

Generation X (1965–1979) – This refers to students born between 1965 and 1979. This generation was the first to grow up with computers. They generally want to build more portable and more resilient careers than their parents. In education, they appreciate feedback and generally want information about their progress ([Coomes and DeBard 2004](#)). Generation X appreciate the opportunity for professional development and some employers may use learning opportunities as a retention device for Generation X employees ([Rood, 2011](#)).

Generation Y (1980–1995) (Millennials) - These are students born between 1980 and 1995, are also called the Millennials. This generation grew up with computers; they also experienced the rapid adoption of the internet, cell phones, and other mobile devices ([Sandeen 2008; Monaco and Martin, 2007](#)). They are highly networked, connected generation and tend to be completely immersed in technology ([Coomes and DeBard 2004; Frand, 2000](#)). The concern for quality education increased in this generation and many millennials began their preparation for higher education earlier than had the preceding generation. Millennials also appreciate feedback, having been graded, evaluated, and ranked throughout their lives. Due to the intense focus on learning and achieving throughout their lives, millennials are likely to appreciate continuous learning opportunities ([Sandeen 2008; Strauss and Howe, 2007](#)). [Howe and Strauss \(2003\)](#) identify seven general characteristics of this generation which are considered to be significant. These characteristics are; sheltered, team-oriented, confident and highly optimistic, pressured, keen to achieve, and conventional.

Generation Z (1996–2003) (The iGeneration) – This refers to students born between 1996 and 2003. They have many labels including iGeneration, Internet Generation, Computer Generation, and Net Natives among others ([Giunta, 2017](#)). This multiple labelling is due to their compatibility and dependency on computer technology ([Slavin, 2014; Koutropoulos, 2011](#)). They have no memory of pre-internet history, and so they believe computer technology is commonplace. They are very active in electronic communities, building communities by wanting to be heard, and actively participating in what is around them and leading. [Giunta \(2017\)](#) notes that they have short attention spans, and they tend to be frequent bloggers and enjoy digital publishing. Compared to their older counterparts, they plan to get educated and to start working earlier, and they prefer the integration of practical experiences within their programme of study. This generation is also described as outspoken, idealistic, action-oriented, and optimistic and they are the first to use emerging technologies.

It is worth noting that though these values may drive the behaviours of individuals in each generation, not all members will share the same values and attitudes though there may be similar visible consumer behaviours among them. However, there is a unique context of the learning process in the undergraduate cohort programmes as a result of the emergence of the three generations. The generations learn from each

other, with each other, and about each other through observation, imitation, and modelling in a multi-generational setting of intergenerational learning (Franz and Scheunpflug, 2016; Corrigan et al., 2013). Regarding the satisfaction of on-line learning of students from these different generations in business education, much scholarly attention has not been given to it (Giunta, 2017; Sandeen 2008).

2.3. Gender and E-learning

The effects of gender on the use of computers and online education have been researched in many disciplines with different results termed mixed effects by (Seters et al., 2012; Dong and Zhang 2011; Yukselturk and Bulut 2009). Horvat et al. (2015) argues that there is a contention divide concerning the use of internet on-line learning and again, the satisfaction levels are higher in a 'combined leaning' than traditional learning group. They continue to argue that the internet is considered as male-dominated because women are constrained in its use due to family and job commitments. This buttresses the point raised by other researchers that male and female experience on-line studies differently as a result of their respective perceptions, performance, motivation, attitudes, study habits and communication behaviours (Dong and Zhang, 2011; Chyung, 2007; Rovai and Baker, 2005). Yukselturk & Bulut (2009) found that significant amount of variance in female students' achievement and self-efficacy for learning and performance is explained by test anxiety while the variance in the male student's achievement is explained by task value. Contrary to the above, other results have suggested gender effects appear to be insignificant (Al-Azawei et al., 2017; Hung et al., 2010; Seters et al., 2012; Yukselturk and Bulut, 2007; Astleitner and Steinberg, 2005). That notwithstanding, literature acknowledges that people are not so naturally divided into two categories and that there is a need for more research on the gender debate about differences and similarities from learning strategies to performance (Horvat et al., 2015; Chyung, 2007; Rovai and Baker, 2005).

3. Research questions

The purpose of this study is to examine student's satisfaction essentials by looking at the effects of the elements of student satisfaction on online learning in the context of the learner's characteristics of gender and the emerging concepts of multi-generational cohorts in the traditional undergraduate degree-awarding programmes. In particular, we study the differences in student's satisfaction essentials of learning on the Moodle Learning Management System (LMS) from the perspectives of gender and the social categorisations of Generations X, Y and Z of Business School undergraduate students' cohort programme taking an online course. Student satisfaction has been defined as the perceived value of one's educational experiences in an educational institution (Astin, 1993). From the literature, several factors influence student satisfaction in an online learning environment (Dziuban et al., 2005), of which Bolliger and Martindale (2004) identified three major influencing factors to a student's online satisfaction as the instructor, technology, and interactivity. Other factors identified are communication with all other course constituents, course management issues, and course management systems used. Also, literature identified six critical dimensions affecting learner satisfaction as learners, instructors, course, technology, design, and environment (Sun et al., 2008). Other studies have used user satisfaction in assessing e-learning systems success as a single comprehensive factor. These components have been known to be affected by differences in how people learn, as well as the individual's age, values, needs, preferences, and behaviours (Seters et al., 2012; Dong and Zhang, 2011; Yukselturk and Bulut, 2009; Sun et al., 2008; Chyung, 2007).

In this work we look at an online learning management system as having four main components recognised in the literature (Mtebe and Raisamo 2014; Mtebe and Raphael 2018); course design, course delivery; course and course delivery environment. We, therefore, present the research questions as:

RQ1 - Do generational differences affect students' satisfaction with the e-learning system?

RQ2 - Do gender differences affect students' satisfaction with the online learning system?

RQ3 - What are the student stakeholders' satisfaction characteristics of e-learning that are influenced by stakeholder student gender and generations interactions in an online undergraduate curriculum?

The answers to these research questions could contribute to the understanding of student utilization satisfaction that could extend knowledge in the area of gender and generational effects, with programme design and pedagogical implications for online learning system use for multi-generational cohorts in higher education for stakeholders (lecturers, curriculum designers, career development and student affairs staff) involved in teaching and learning.

4. Method

4.1. Application of the Moodle Learning Management System -the context of this research

In 2002, an open-source internal network LMS revolution began which offered free opportunities for teachers and trainers worldwide to create and administer training which was called Moodle. This network has gained global appeal and acceptance and has become a leading network used for blended learning, distance education, and flipped classroom in Higher Education (Keržič et al., 2019; Chaubey and Bhat-tachary, 2015). In this research, a leading business school introduced a blended online course based on the Moodle Learning Management System which is a core course component for all undergraduate business school programme. Students from the first two levels of the course who took a semester course served as the context for the study.

4.2. Participants

The participants were from different birth generations enrolled in the first two years of a 4-year undergraduate business school programme of a tertiary institution based in Accra, Ghana, who completed a core mandatory online course in the first semester of the 2019/2020 academic year. The participants comprised a population of 700. Of these, 300 students registered were from year one, and 400 from year two. In total, 624 students submitted their surveys, out of which 611 responses were usable. This produced a response rate of 89%. The responses were provided voluntarily, and respondents were informed of the possibility of their data being used for publication. Ethical approval was met as per the Institute's ethical guidelines.

4.3. Procedure

Undergraduate students undertaking a core course delivered in a blended environment in their programme were surveyed at the end of the semester as a post-test only quasi-experimental design (Stinchcombe, 2005; Cook and Campbell, 1979). The questionnaire was then administered electronically to students as a Satisfaction Survey on another electronic platform, which made it clear that it was not part of the course assignment to minimize students' perception that they were obliged to complete the questionnaire. Students' grades were also not part of this research. All analysis was done using SPSS 23 software.

4.4. Instrument

The study instrument was derived from a larger survey for evaluating the learning experience and learning management system. As literature, acknowledges that the excessive number of measurements among dependent and independent variables as the main challenge researchers face in researching this area (Al-Fraihat et al., 2020), the study adopted

an instrument to accommodate this challenge. Also, [Bhuasiri et al. \(2012\)](#) and [Mohammadi \(2015\)](#) noted that to account for the variation in e-learning success factors' relative significance which is mainly due to the context, different strategies are adopted to deal with their measurement. From literature, in developing countries, the impediments found in e-learning are resource availability, accessibility and infrastructure ([Aung and Khaing, 2016](#)). Also, the absence of vast communication infrastructure and the role of social factors (e.g. learner and instructor) remain dominant ([Bhuasiri et al., 2012](#); [Mohammadi, 2015](#)). This is in contrast to what pertains in developed countries, where because of the emphasis on enhancing lifelong education, the usefulness of the systems, quality of information, ethical and legal considerations are dominant factors ([Al-Fraihat et al., 2020](#); [Aung and Khaing 2016](#); [Stone and Zheng, 2014](#)).

The portion of the study instrument relevant for this study dealt with participant satisfaction with their learning experience which utilized a set of fifteen items measuring four components of their experience. These were from the standard evaluation questionnaire used by tertiary institutions. The instrument measures four components with the following items: 1) Course Design (Detailed Course Outline provided; Objectives of course communicated; Learning outcomes indicated at the beginning; Current and relevant course content); 2) Course Delivery (Speakers enthusiasm about their topics; Sequence of sessions followed in the course outline; Topics presented appropriately; Session content thoroughly covered; Learning outcomes achieved) ; 3) Course Interaction (Electronic Forums available for interaction; Coordinators available during stated office hours; Fair and respect for student's interaction); and 4) Course Delivery Environment (Availability of Internet; Availability of computers; Maintenance of infrastructure (use without any problems)). We decided to measure them as a formative index using Likert-type items on a 7-point scale of satisfaction to ascertain the level of personal satisfaction.

The instrument included an item on gender since the literature indicated there were gender differences in the generational characteristics ([Cambiano et al., 2001](#)). Programme time, which is the time students have their course of study at the institute, that is, day or evening, was added to elicit the differences between the time of the programme and the status of the students, since most of the students termed as part-time/student workers followed an evening programme, but other full-time students in the cohort under study also had evening programmes ([Little, 2005](#); [McDowell, 1993](#)). An item on work experience was also included ([McDowell, 1993](#)). Additionally, items on the preferred method of delivery measured normatively and overall satisfaction measured on a 7-point scale of satisfaction were included. The three main generations were operationalized as Generation X (40–54 years), Generation Y (24–39 years), and Generation Z (16–23 years) ([Giunta, 2017](#); [Edelman/StrategyOne, 2010](#); [Wendover, 2002](#)).

4.5. Reliability and validity

The study used formative items summated scale which was subjected to a purification process ([Churchill, 1979](#); [DeVellis, 2003](#)) all the dimensions exhibited adequate unidimensionality for the research ([Hair et al., 2010](#); [Tarling 2009](#)). As traditional measures of validity are not appropriate for formative constructs ([Chin, 1998](#)), face validity was achieved by an in-depth literature review, conducted to identify the relevant concepts related to factors influencing business management education in a multi-generational context. Content validity in this research was achieved by making sure all the research objectives were reflected in the questionnaire ([Babbie and Mouton 2007](#)).

5. Analysis

A simplified summated scale for the measurement of the satisfaction of online learning was developed by purifying the items adapted from the course evaluation ([Spector, 1992](#)). From the 15 items, the reliability was

measured with a Cronbach alpha of 0.96 indicating a high level of internal consistency for the scale. Also, a factor analysis loading on the four components of the Eigenvalue of 84.01%, a Kaiser-Meyer-Olkin measure of sampling adequacy of 0.96 and a significant ($p > 0.001$) Bartlett's Test of sphericity. Normality in data was assumed as skewness fall within the +2 to -2 range recommended for ordered categorical data and significant ($p > 0.001$) Kolmogorov-Smirnov test ([Hair et al., 2010](#)). We, therefore, proceed to use the measures in our analysis. Descriptive statistics of the measures based on the two variables, generations and gender are shown in [Table 1](#) in the results. Then, One-way ANOVAs and factorial ANOVAs were conducted on the independent variables, generation and gender to determine differences in satisfaction of the components evaluating online learning management system. The Turkey HSD post hoc tests were applied and effect sizes calculated using the SPSS 23 software.

[Lakens \(2013, p.9\)](#) recommended the reporting of generalized eta squared (η^2) effect sizes for ANOVAs and interpreted, by comparing them to other effects in literature or through the common language effect size. We, therefore, calculated effect sizes for the One Way and Factorial ANOVAs in the analysis. For interpretation, we deduce from literature ([Sullivan and Feinn 2012, p.281](#); [Bickman and Rog 2009, p.69–71](#)) to use common effect size interpretation. From [Table 2](#) which was adapted from [Yang and Dalton \(2012, p.3\)](#), in a normal distribution, an effect size of 0.1 indicates the effect of the treatment will correspond or occur at a probability of 53%. We, therefore, proceed in our discussion to interpret our analysis with this common language guide.

6. Results and discussion

6.1. Sample characteristics

The sample ($N = 611$) consist of 60.2 % females and 39.8% males; 43.0% Full-Time students and 57.0% Student Workers; 33.4% are in the day programme and 66.6% in the evening programme. The participants are from the following Bachelor of Science (Honours) Business Administration programme with specializations: Procurement (18.8%); Project Management (9.2%); Tourism and Hospitality (9.8%); Accounting (7.7%); Administration (32.6%); Finance (5.6%); Human Resource (12.3%) and Marketing (4.1%). Also, 30.4% have no work experience; 9.0% have up to 1 year; 16.2% up to 2 years; 21.4% up to 5 years; 11.3% up to 10 years and 11.6% have more than 10 years. For the social categorisations of birth generations, the sample consisted of 201 (32.9%) Generation Z (16–23 yrs), 362 (59.2%) Generation Y (24–39 yrs) and 48 (7.9%) Generation X (40–54 yrs). Also, 43.0% were full-time students and 57.0% student workers.

6.2. Results

6.2.1. RQ1 - Do generational differences affect students' satisfaction with the E-learning system?

Using one-way ANOVAs, the analysis revealed a statistically significant difference between generations for satisfaction with course design ($F(2,608) = 3.701, p = .025, \eta^2 = .012$). A Tukey HSD test revealed satisfaction for course design was statistically significantly higher for Generation X ($M = 5.94, SD = 1.04$) compared to Generation Z ($M = 5.37, SD = 1.33, p = .018$). However, there was statistically non-significant difference between Generation X ($M = 5.94, SD = 1.04$) and Generation Y ($M = 5.49, SD = 1.33, p = .064$). And also, the difference between Generation Y ($M = 5.49, SD = 1.33$) and Generation Z ($M = 5.37, SD = 1.33, p = .552$) did not reach statistical significance. Therefore, there are differences between generations for satisfaction with course design, and Generation X and Generation Z are statistically different. The results also reveal generations have statistically significant difference on satisfaction with course delivery ($F(2,608) = 3.744, p = .024, \eta^2 = .012$). A Tukey HSD test revealed that satisfaction for course delivery was statistically significantly higher for Generation X ($M = 6.03, SD = .98$) compared to Generation Z ($M = 5.46, SD = 1.33, p = .018$). However, there were

Table 1. Descriptives and correlations of measures.

Measures	1	2	3	4	5	Gender	Gender	Generation	Generation Y	Generation X
						Male	Female	Z (IGeneration)	(Millennials) (24–39 yrs)	(40–54 yrs)
						M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Rating of Total Satisfaction (Overall Satisfaction)	–					5.62 (1.24)	5.60 (1.16)	5.41 (1.19)	5.64 (1.21)	6.19 (0.73)
Course Design	.588**	–				5.46 (1.36)	5.50 (1.29)	5.37 (1.33)	5.49 (1.33)	5.94 (1.04)
Course Delivery	.596**	.909**	–			5.50 (1.33)	5.62 (1.27)	5.46 (1.33)	5.58 (1.30)	6.03 (0.98)
Course Interaction	.550**	.770**	.769**	–		5.27 (1.38)	5.27 (1.31)	5.32 (1.29)	5.20 (1.40)	5.61 (0.94)
Course Delivery Environment	.369**	.512**	.509**	.629**	–	4.56 (1.63)	4.32 (1.71)	4.65 (1.63)	4.30 (1.67)	4.95 (1.61)

** Correlation is significant at the 0.01 level (2-tailed).

$N = 611$.

Table 2. Interpretation of effect sizes.

Effect Size	Percent of Non-Overlap of two populations (U_1)	Percentage in the second population that exceeds the same percentage in the first population (U_2)	Percentage of the first population which the upper half of the second population exceeds (U_3)	Common Language Effect Size (CLES)
0.0	0.0	50.0	50.0	0.50
0.1	7.7	52.0	54.0	0.53
0.2	14.8	54.0	57.9	0.56
0.3	21.3	56.0	61.8	0.58

statistically non-significant differences between Generation X ($M = 6.03$, $SD = .98$) and Generation Y ($M = 5.58$, $SD = 1.30$, $p = .061$). And also, for Generation Y ($M = 5.58$, $SD = 1.30$) with Generation Z ($M = 5.46$, $SD = 1.33$, $p = .558$). Therefore, there are differences between generations for course delivery, and Generation X and Generation Z are statistically different. Besides, there is no difference between Generation Y and Generation Z. These results are in line with the current literature on multi-generations for differences in generations of students and the influence of their characteristics on use of E-Learning (Selingo 2018; Seters et al., 2012). Generation Z are generally considered to be the internet generation and therefore very different from Generation X (Sandeem, 2008; Hole et al., 2010). However, the addition to knowledge is the apparent statistical non-distinction of Generation Y to both Generations X and Z which could be attributed to the complex concept of intergenerational learning (Franz and Scheunpflug, 2016).

From the analysis, there was statistically significant difference between generations for satisfaction with course delivery environment ($F(2,608) = 5.052$, $p = .007$, $\eta^2 = .016$). A Tukey HSD test revealed that satisfaction for course delivery environment was statistically significantly different for Generation Z ($M = 4.65$, $SD = 1.63$) compared to Generation Y ($M = 4.30$, $SD = 1.67$, $p = .048$). Also, there was statistically significant lower satisfaction for Generation Y ($M = 4.30$, $SD = 1.67$) compared to Generation Z ($M = 4.65$, $SD = 1.63$, $p = .048$) and Generation X ($M = 4.95$, $SD = 1.61$, $p = .029$). There was no statistically significant difference between Generation X ($M = 4.95$, $SD = 1.61$) and Generation Z ($M = 4.65$, $SD = 1.63$, $p = .482$). Therefore, there are differences between generations for satisfaction with course delivery environment and Generation Z and Generation Y are statistically different. Generation Y have the lowest satisfaction for the course delivery environment followed by Generation Z and Generation X respectively. This is important since Selingo (2018) identified Generation Y as the generation which grew up with high affinity for quality education and McCuskey (2020) identified them as the generation that introduced consumerism to higher education.

Furthermore, the analysis found statistically significant difference between generations for satisfaction with preference of mode of delivery ($F(2,608) = 3.644$, $p = .027$, $\eta^2 = .012$). A Tukey HSD test revealed

satisfaction with preference of mode of delivery was statistically significantly lower for Generation Z ($M = 2.36$, $SD = .843$) compared to Generation X ($2.71 \pm .582$, $p = .020$). Also, there were statistically non-significant differences in satisfaction of preference of mode of delivery between Generation Z ($M = 2.36$, $SD = .843$) and Generation Y ($M = 2.43$, $SD = .814$, $p = .538$), and between Generation Y ($M = 2.43$, $SD = .814$) and Generation X ($M = 2.71$, $SD = .582$, $p = .070$). Therefore, there are differences between generations for satisfaction with preference of mode of delivery and is lower in Generation Z than in Generation X. However, there are no differences between Generation Z and Generation Y, and between Generation Y and Generation X. This result, we posit may be due to the generational gap between students in Generational Z and the instructors who may be from Generation Y or X (Giunta, 2017).

In addition, there was statistically significant difference between generations for total satisfaction of the course ($F(2,608) = 8.703$, $p < .001$, $\eta^2 = .028$). A Tukey HSD test revealed total satisfaction was statistically significantly higher for Generation X ($M = 6.19$, $SD = .734$) and Generation Z ($M = 5.41$, $SD = 1.193$, $p < .001$) and Generation Y ($M = 5.64$, $SD = 1.213$, $p = .007$). Also, there was statistically non-significant difference between Generation Z ($M = 5.41$, $SD = 1.193$) and Generation Y ($M = 5.64$, $SD = 1.213$, $p = .076$). On the contrary, there was statistically non-significant difference between generations for satisfaction with course interactions ($F(2,608) = 2.195$, $p = .112$, $\eta^2 = .007$). Therefore, there are differences between generations for total satisfaction of the course. Total satisfaction for the course is highest in Generation X followed by Generation Z and Generation Y respectively. This result reveals differences in the satisfaction for components of the course and its total satisfaction. Also, though Generation X may have satisfaction issues with other components of the E-Learning they have the highest satisfaction with total course satisfaction. A show of their appreciative characteristic to Higher education learning and professional development (Rood 2011; Coomes and DeBard 2004).

6.2.2. RQ2 - Do gender differences affect students' satisfaction with the online learning system?

One-Way ANOVAs were utilized to determine if the independent variable gender has a statistically significant effect on the satisfaction of

online learning management system components. It was found to be statistically non-significant for differences in satisfaction with the online course by gender for course design ($F(1,609) = .143, p = .705, \eta^2 = .000$), course delivery ($F(1,609) = 1.166, p = .281, \eta^2 = .002$), course interaction ($F(1,609) = .002, p = .968, \eta^2 = .000$) and course delivery environment ($F(1,609) = 3.049, p = .081, \eta^2 = .005$). Also, differences by gender for preference of mode of delivery ($F(1,609) = .201, p = .654, \eta^2 = .000$) and rating of total satisfaction of the course ($F(1,609) = .057, p = .811, \eta^2 = .000$) did not reach statistical significance. Thus, gender differences do not affect the student's satisfaction with the online learning system used in an undergraduate business school cohort programme. In literature, [Astleitner, and Steinberg \(2005\)](#) in a meta-study where gender was statistically significant in online learning studies found effects sizes (η^2) averaging .30 (with a standard deviation of 0.63), which from [Table 2](#) indicates an effect of gender will correspond or occur at a probability of 58%. Therefore, concluding that gender only has a very small practically relevant effect on different variables which are important in online learning. Also, the literature attest to these mixed outcomes for satisfaction by gender ([Al-Azawei et al., 2017](#); [Ramírez-Correa et al., 2015](#); [Bruestle et al., 2009](#); [Price, 2006](#)).

6.2.3. RQ3 - What are the student stakeholders' satisfaction characteristics of E-learning that are influenced by stakeholder student gender and generations interactions in an online undergraduate curriculum?

Using factorial ANOVAs the analysis found statistically non-significant differences between interactions effects of generations and gender in the components of the Online Learning Management System satisfaction with course design ($F(2,605) = 2.281, p = .103, \eta^2 = .007$); satisfaction with course delivery ($F(2,605) = 1.926, p = .147, \eta^2 = .006$); satisfaction with course interaction ($F(2,605) = .386, p = .680, \eta^2 = .001$); satisfaction with course delivery environment ($F(2,605) = .223, p = .800, \eta^2 = .001$); satisfaction with preference of mode of delivery ($F(2,605) = 1.445, p = .237, \eta^2 = .005$) and total satisfaction with the course ($F(2,605) = .235, p = .790, \eta^2 = .001$). Thus, there are no differences of interactive effects of generations and gender satisfaction in this population. This result feeds into the debate of gender interactions in E-Learning in the literature which has led to mixed results ([Al-Azawei et al., 2017](#); [Ramírez-Correa et al., 2015](#); [Bruestle et al., 2009](#); [Price, 2006](#)).

7. Limitations, recommendation for practice and further research

Finally, the limitations of the study include the inability to completely control sample was drawn from one tertiary institution, which may influence the responses and therefore the generalisability of the findings. The paper also provides an opportunity for future research, which could examine the variables through a longitudinal study to provide evidence on the changing patterns over time, compliance with study ethics and relationships with perspectives of satisfaction of lecturers and instructional designers.

For practice, the study reveals students' generational differences affect student's satisfaction of online learning system by primarily affecting the following components of the course design; course delivery; course delivery environment; preference of the mode of delivery and total satisfaction of the course. From the effect sizes (η^2) analyses, generational difference effects for student's satisfaction of online learning system are shown in the following components of the Online Learning Management System. From [Table 2](#) generational effects account for a probability of about 53% for satisfaction with course design ($\eta^2 = .012$); satisfaction with course delivery ($\eta^2 = .012$); and satisfaction with preference of mode of delivery ($\eta^2 = .012$). A probability of approximately 56% effect in satisfaction with course delivery environment ($\eta^2 = .016$) and 58% for total satisfaction of the course ($\eta^2 = .028$).

The analysis for gender found it does not affect learning in the online Learning Management System. This study, therefore, adds to the

literature of studies on online learning ([Seters et al., 2012](#); [Dong and Zhang 2011](#); [Yukselturk and Bulut 2009](#)). Besides, in a developing country setting gender does not affect online learning in the face of the argument of contention of the gender divide in the use of internet online learning and higher levels of satisfaction in "combined" or multigenerational learning groups ([Horvat et al., 2015](#)).

Generation X: In a multi-generations undergraduate online learning environment, Generation X contextualise the highest satisfaction for course design, course delivery, preference for mode of delivery and total overall satisfaction. This is borne out of the characteristic of appreciation for professional development.

Generation Y: Generation Y in a multi-generational undergraduate online learning environment have the least contextualisation of satisfaction for course delivery environment and total satisfaction with courses. This may be contrary to expectation for a generation that grew up with computers but can be due to the lack of the use of computers in their learning process in their educational environment.

Generation Z: Generation Z in a multi-generational undergraduate online learning environment has high satisfaction for course delivery environment, and moderate satisfaction to course design, course delivery and preference of a mode of delivery. This is the Internet Generation and as such s due to their compatibility and dependency on computer technology.

8. Conclusions

The results reveal differences in student's satisfaction for online learning management systems based on the generation cohort in a multi-generational cohort of an undergraduate business programme. Therefore, in our desire to engage in the online undergraduate degree-awarding programmes in our current multi-generation cohort programmes there is a need to assess the composition of the cohort to recognise how learning and its satisfaction takes place in the cohort to inform and contextualise teaching. Also, there is a need to vary the emphasis placed on the components of the course on a continuum to accommodate the composition of the cohort. These findings provide important contributions for lecturers, curriculum designers, and the career development and administrative staff of HEIs to input into strategies of online courses design, which will enhance student learning and experience.

Declarations

Author contribution statement

D. E. Yawson: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

F. A. Yamoah: Conceived and designed the experiments; Wrote the paper.

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The authors declare no conflict of interest.

Additional information

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