This is a peer-reviewed, accepted author manuscript of the following article: Ojiako, U., Chipulu, M., Ashleigh, M., & Williams, T. (2014). Project management learning: key dimensions and saliency from student experiences. International Journal of Project Management, 32(8), 1445-1458. https://doi.org/10.1016/j.ijproman.2014.02.002

Project Management Learning: Key dimensions and saliency from student experiences

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Abstract

Drawing upon literature, this study seeks to understand what the key dimensions of student experiences of project management learning are and what saliences students attach to such dimensions. Data is obtained from a sample of management and engineering students studying project management across four universities in the United Kingdom. We employ multidimensional scaling to extract the salience placed by students on the key dimensions. The results of the data analysis suggest that there are six dimensions of student experiences of project management. We also find that students attach markedly different levels of salience to these dimensions based on a number of demographic factors. More specifically, in terms of salience, we found that gender had the strongest relationship while prior experience of project management had the weakest. The implications of our findings are discussed from the perspective of andragogical congruence (compatibility) in teaching and learning.

Keywords: project management, teaching and learning, students, dimensions, salience

1. Introduction

'Project Management' remains a very popular management concept due to its emphasis on management control in discontinuous and chaotic business environments (Bryde, 2003). Project managers remain vital in the transformation process of most organisations (Paton et al., 2010) although scholars such as Lenfle and Loch (2010) have questioned how project management can ensure real value in delivering change, especially when one notes the high failure rates of projects. The role that project managers play in delivering change has made the issue of teaching and learning and specifically andragogy[1], a topic of sustained research interest in project management scholarship (see Berggren and Soderlund, 2008; Pant and Baroudi, 2008; Chipulu et al., 2011; Ojiako et al., 2011a, 2011b, 2013; Ashleigh et al., 2012). At the heart of challenges faced by this discourse is that project management is contextualized within a control perspective (Koskela and Howell, 2008; Ojiako et al., 2011b; Mir and Pinnington, 2014), which suggests that the future can successfully be predicted with available data (Herath, 2007; Berry et al., 2009), reducing phenomena to simple cause and effect relationships. Such 'cause and effect' relationships, implies not only a rigid utilization of project management methodologies but also rigid control and measurement (assessment) of outputs (Williams, 2005); in effect, an instrumental ideology (Lenfle and Loch, 2010; Soderlund, 2011) with an easily attributable link between the decisions made by project managers and project (or task) outcomes. It also implies that the project manager role is primarily that of a 'control' manager with limited decision making power. Management 'control' has implications for the training and education of project managers; the ability of project managers to exercise effective control over projects is a function of their competency as managers. This is why the learning process

[1] Although it remains popular to discuss teaching and learning within higher institutions under the popular terminology of 'pedagogy', in this paper, we use the more appropriate term of andragogy which refers to the strategy of adult learning (see Knowles, 1968; Davenport and Davenport, 1985).

is seen as central to the management control philosophy (Hult et al., 2003). Cognizant of this implication, scholars have either called for (i) greater emphasis on matching project managers to projects (Patankul et al., 2007; Malach-Pines et al., 2009), although this tends to rely heavily on selection to meet staffing demands in projects. This is because, as we pointed out in the earlier review of the 'input control' philosophy, on the surface, it may appear more cost effective to recruit experienced project staff than to develop them. The trouble with this approach is that project task requirements are likely to change over different stages of the project (even in relatively stable projects). In addition to calls for matching project managers to projects, learning is also key to management control philosophy in that the need and level of management control makes demands on project managers to acquire and maintain a level of leadership skills that is not only situational (Lee-Kelley, 2002; Barber and Warn, 2005), but also most likely to support the achievement of project outcomes which are strategic in nature (Turner and Muller, 2005).

Given that project management is clearly important within organisations, and specifically salient in operational processes, this paper aims to contribute to the body of knowledge on the teaching and learning of project management which has been in development over a number of years. Under such a learning paradigm, there has been a growing interest among various stakeholders (students, industry and the profession) in how to best articulate an agenda for learning. Such an agenda will however require aggregating student learning and success. Such an aggregation may facilitate confirmation that students are achieving the desired learning outcomes.

In this study, our particular focus is on understanding what the key dimensions of students' experiences of project management learning are and what saliences (relative importance), students attach to such dimensions. In order to achieve this objective, the rest of this paper is organised as follows. Following this introduction, in section two a review relevant

literature on project management andragogy is undertaken. Literature will show that on-going discourse on project management andragogy not only faces considerable challenges studying learning styles, but also has not given a significant voice to the experiences and expectations of students. In section three, we present our research methodology which is undertaken utilising 3-way Multidimensional Scaling (MDS). In section the results of the data analysis are discussed. Here, we show the salience both sets of students attach to the six dimensions of student experiences of project management that emerged from section three. Most importantly, we find that gender specific differences had the strongest relationship with the six dimensions. In the penultimate section of the paper, we discuss the implications of the findings, suggesting that there is a need for a gender responsive andragogical imperative in the teaching and learning of project management. We conclude the paper in section six by outlining the contributions of our research and suggestions for further work.

2. Review of Literature

Organization's generally utilize management development or training to ensure that desired behaviors align with expectations (and so increase project success rates). Management development is conceived by scholars (Paauwe and Williams, 2001; Gale and Brown, 2003; Kirkbride, 2003), as the training, education and exposure of managers to ideas and *tacit* knowledge that facilitates their acquisition of new skills and behaviors that are of value to the firm. Tacit knowledge is defined subjective knowledge that is 'based on individual experiences' (Anand et al., 2010; p. 304). Training, on the other hand, is a formal form of instruction, encompassing broad categories comprising technical and interpersonal skills acquisition (Buckley and Caple, 2007). To study skills acquisition fully, it is necessary that learning styles are fully comprehended. This is why the question '*what are the key dimensions of learning*

styles?' remains of interest to a number of scholars seeking to improve skills acquisition in the field of project management (Pant and Baroudi , 2008; Thomas and Mengel, 2008).

The imperatives associated with teaching and learning of project management was highlighted as a major theme of interest during the debate on "Rethinking project management" (Cicmil et al., 2006; Winter et al., 2006) and have attracted the interest of a number of scholars including Geist and Myers (2007), Berggren and Soderlund (2008), Pant and Baroudi (2008), Paton et al. (2010) Chipulu et al. (2011), Ojiako et al. (2011a, 2011b, 2013) and Ashleigh et al. (2012). Specifically Geist and Myers (2007) drew upon a combination of teaching and learning and project management literature to suggest that best practice in the teaching of project management involves a novel and harmonious conjunction of practical activity and theory building teaching and learning approaches. Conversely, Berggren and Soderlund (2008) developed a model based on six distinct, but dependent learning modes that emphasised interaction as a learning practice. In a similar light, Pant and Baroudi (2008), examined current trends in the teaching and learning project management suggesting that education in project management still appeared to emphasise the development of hard skills at the expense of softer skills.

Although these studies all contribute significantly to on-going discourse on teaching and learning in project management, they do not seek to interrogate or give a voice to other major stakeholder in this discourse; employers (industry) and students. For example, from an industry perspective, Chipulu et al. (2013) analysed the contents of over two thousand online job project management advertisements across eight countries, reporting that industry placed an emphasis on hiring project managers who demonstrated softer skills than those with 'harder' and technical skills during recruitment. From a review of the few studies (Chipulu et al., 2011; Ojiako et al., 2011a; Ashleigh et al., 2012) that have sought to explore project management andragogy from the students perspective and in the process give students a 'voice' in the on-

going discourse, we can posit the following; (i) Project management, in a number of cases, especially in institutions of higher education continues to be taught at the same level as both certificate and commercial project management training programmes (Crawford et al., 2006), (ii) Relatively few academics in the field of project management have real experience or can seamlessly bridge the academic-practitioner divide (Geist and Myers, 2007), (iii) The blending of theory and activity based learning techniques that facilitates effective teaching of project management still appears elusive in some higher institutions (Ashleigh et al., 2012), (iv) The teaching of project management in some instances does not highlight either the complexity associated with projects or broader conceptualisations of projects (Crawford et al., 2006), (v) Project management andragogy requires an appropriate level of flexibility in order to cope with differences in students learning styles and preferences (Ojiako et al., 2011a; Ojiako et al., 2013), and (vi) Scholars are yet to robustly address how individual and demographic differences in age, gender, nationality (national culture) and ethnicity may impact upon learning experiences, expectations and choice of project management learning approach. This is in light of existing studies which highlight the role of demographic variables in andragogical considerations (see Trenor et al., 2008; Jeffrey, 2009; Cassidy, 2012).

One of the challenges for this is that there are difficulties studying learning styles. Critics for example Reynolds (1997), point out that a large number of the emergent learning style models are limited in application because they are based on homogeneous samples. The research in the area is so eclectic (Sadler-Smith et al., 2000) that numerous learning style models, e.g. Dialogical Experiential learning (Bevan and Kipka, 2012; Desmond and Jowitt, 2012) and Blended learning (Fleck, 2012), have been developed. The sheer multiplicity of models means there is a lack of conceptual clarity on learning styles. There are also questions about whether learning styles are fixed or dynamic; whether they are context-specific (Cassidy, 2004). Within project environments, such contentions result in the question: are learning styles

dynamic so that they change over the duration of a project; do they fluctuate across project phases? From this review, we posit that what remains unknown in current studies are the salience of the dimensions of students studying project management. Based on this identified gap therefore our research question is; *What are the key dimensions and saliences of students' experiences of project management learning and how do demographic differences impact on such experiences?*

3. Research Methodology

3.1 Project management in the disciplines

In order to address the research question, we chose to focus on student experiences between two distinct disciplines that employ project management; management and engineering. In the case of the management profession, studies by Paton et al. (2010) have identified core project management skills, e.g. planning and organisation, as constituents of Fayol's (1916) original principles of management. In the case of engineering, the need to effectively train engineers to be managers is also of interest to practitioners (Hamilton 2006; Hall et al., 1992), thus ensuring that project management is a core element of the engineering profession. This is typified by the stance taken for example by professional institutions such as the Institution of Civil Engineers (ICE) and the Institution of Mechanical Engineers (IMechE). For example, while the ICE mandates that engineers seeking the status of a Chartered Engineer (CEng) show demonstrable ability to not only 'plan, direct and control tasks, people and resources'(ICE, 2011; p.1) but also to 'lead teams and develop staff to meet changing technical and managerial needs' (ICE, 2011; p.1), the IMechE in its competence statements exemplar mandates that candidates for CEng status show evidence of 'Leading on preparing and agreeing implementation plans' (IMechE, 2012, p. 4). Candidates seeking the status of a Chartered Engineer (CEng) are also expected to 'Ensure that the necessary resources are secured and brief the project team'

(IMechE, 2012, p. 4). All highlighted task requirements are arguably, key project manager competencies.

3.2 Data collection

Data were collected using a survey instrument first developed by Ojiako et al (2011a) and later employed by Chipulu et al. (2011), Ashleigh et al. (2012) and Ojiako et al. (2011b, 2013). We chose to utilise this survey instrument as it is one of the few available instruments developed specifically for gathering empirical data on teaching and learning in project management. Motivated by a need to comprehensively understand learning and teaching challenges in project management, the survey, shown in Table 1, comprised six questions. For brevity, questions 1 and 2, which focussed on general survey information (including informed consent), are omitted in Table 1. Questions 3 and 4 were to establish the students' individual and background characteristics, namely gender, prior experience of work and study of project management; their university, faculty (management or engineering discipline), program of study (undergraduate or postgraduate). In question 5, the students were asked to rate on a five-point Likert scale ('strongly disagree' to 'strongly agree') their learning experiences within the project management environment. Similarly, in question 6, they rated their experiences of e-learning[2] on a 5-point Likert scale ranging from 'extremely low' to 'extremely high'.

(INSERT Table 1 here)

To collect the data, paper copies of the survey were administered to students taking a module in project management by their module instructors[3] at or near the end of the module

[2] As e-learning is out of scope of this current study, we did not discuss associated findings related to this question.

[3] The primary author of this paper was one such instructor. The other co-authors were not.

across four English universities anonymised in this paper as *Uni_A, Uni_B, Uni_C* and *Uni_D*. *Uni_A* and *Uni_B* are 'Russell Group' universities, representing 24 public research universities in the United Kingdom. *Uni_C* and *Uni_D* on the other hand are drawn from the 'University Alliance', an association of 23 universities (in the United Kingdom), which focus their teaching and learning strategy primarily on delivering professional and business education. With the exception of the University of Salford and the Open University, all member of the 'University Alliance' had originally been British polytechnics[4], focusing on work oriented and applied education. This implied a less emphasis on research (than the Russell Group).

The sampling of universities was purposive in that: (i) *Uni_A* and *Uni_B* are research intensive. *Uni_C* and *Uni_D* are teaching-centred. We were thus able to capture any differences in student experiences as a result of this difference in institutional focus. (ii) All four universities teach project management either as an elective module within the management discipline or a core module in engineering disciplines[5] so that our selection of universities simultaneously allowed us to obtain a sample representing both types of module (elective or core) and the discipline (management or engineering).

(INSERT Table 2 here)

In total, we collected 409 usable responses. Table 1 and Table 2 provides information on the characteristics of the population. The collected usable responses represented an overall response rate of 71%, which split by university and by faculty as shown in Table 2. Of the 409, 47% were management students and 53% engineering. There were differences in the distributions of students' individual and background characteristics between the two disciplines.

[4] Polytechnics in the United Kingdom gained 'university' status following the promulgation of the Further and Higher Education Act of 1992.

[5] We have included students studying construction management and construction engineering.

While there was an almost equal (50.4% male) gender-split among management students, most (84%) of the engineering students were male. The proportion of management students (4%) with prior experience of project management study was much lower than the 38% of engineering students. 13.1% of management students had prior work experience of project management compared to 36.8% of engineering students.

3.3 Data Analysis

To address the research question, we used *3-way Multidimensional Scaling (MDS)* (Kruskal, 1964; Kruskal and Wish, 1978) to extract the key dimensions of student experiences of project management learning based on similarities (or proximities) among the 42 variables representing students' responses to items under questions 5 and 6 of the survey. We chose 3-way MDS over alternative dimensional data reduction techniques such as factor analysis for two reasons: Firstly, MDS does not carry restrictive distributional assumptions such as normality and is appropriate for ordinal scaled data such as ours whereas factor analysis is, strictly speaking, inappropriate (even though it is frequently used with Likert-scaled data). Secondly 3-way MDS allowed us to measure the different levels of salience management and engineering students attach to the key dimensions of student experiences' of project management learning, thus addressing the research question.

To determine the number of dimensions to retain in the final 3-way MDS solution, we adopted a strategy used by others, such as (Neophytou and Mar Molinero, 2004), by conducting categorical principal components analysis (CATPCA) of the 42 variables, *a priori*, of the MDS. Taking a *bootstrapping* approach, the CATPCA was conducted five times, each time taking a 70% random sample of the cases and specifying that the maximum possible number of components of 42 be extracted. We then used scree plots of the results from the five models to judge the optimal number of dimensions to be extracted in the 3-way MDS. Finally,

to explore how the extracted dimensions may be related to the individual and background characteristics of the students, we conducted property fitting (or Pro-fit) (Schiffman et al., 1981). All the data analysis was conducted in SPSS 18.

4. The Results

4.1 CATPCA results and 3-way MDS model fit

Figure 1 shows the scree plots based on the per cent of variance explained by each component obtained from the five *CATPCA* models. All five lines exhibit a change in gradient (or 'elbow') at component three, suggesting the majority of the variance in the data can be captured using the first three components. However, it can also be seen that between components 3 and 6, the lines are somewhat divergent.

(INSERT FIGURE 1 HERE)

After six components, the per cent of variance accounted for by successive components hardly changes. This indicates that perhaps as much as six components are required to capture most of the variance in the data, even though the latter three components may be of lesser substantive importance. Based on this judgement, we conducted the 3-way MDS analysis by specifying the number of *dimensions*[6] to extract as six.

The final 3-way MDS model was extracted with a *Kruskal's Stress-I* value of 0.19 and the model accounted for 86% of variance in the data. Both measures indicate a good fit. As *Shepard's rough non-degeneracy index* was 0.78, we inferred that the model is unlikely to be degenerate, a conclusion supported by the comparative levels of the coefficients of variation of

[6] In this paper, we have used the words 'component' and 'dimension' interchangeably.

the original and the transformed proximities which were 0.38 and 0.57, respectively. Satisfied with the model fit, the next stage of the data analysis was to interpret dimensionality.

4.2 Dimensional Interpretation

Dimensional Interpretation Strategy: Table 3 shows the coordinates of each of the 42 survey variables measuring students' experiences of studying project management on each of the six dimensions. The interpretation of MDS dimensions, like other dimensional reduction techniques, is typically based on variables with very large absolute values of the coordinates as such variables are the most strongly associated with the dimension and represent its most distinguishing features.

(INSERT TABLE 3 HERE)

As such, in Table 3, we have highlighted in bold the variables with the largest coordinates (absolute values greater than unity) on each dimension. It is usual too, in MDS, to aid dimensional interpretation by visualising the data structure using 2-dimensional projection maps of the extracted multi-dimensional structure. With six dimensions, there are fifteen 2-dimensional projections in total. We examined all 15 but for brevity we present below (Figures 2 to 4) only the maps that we found to give the clearest indications of the meaning of each dimension. Using these methods, we interpreted the dimensions as (1) Transferrable Skills; (2) Online Materials Usage; (3) Analytic Skills; (4) In-class Collaboration; (5) Out-of Class Collaboration; and (6) Curriculum Balancing. Below we explain in greater detail why we came to these interpretations of the dimensions.

Dimension 1: 'Transferrable Skills': Figure 2 shows the projection of the MDS structure in dimensions 1 and 2. In the far eastern part of the map, it can be seen that variables

such as generic problem solving (*prob_solve_general*), increased confidence in ICT (*ICT_confidence*), interpersonal relationships (*interperson_1, interperson_2*), time management (*self_manage_1, self_manage_2*), have very large positive values on dimension 1.

(INSERT FIGURE 2 HERE)

In contrast, in the western half, it can be seen that variables indicative of passive student experiences, i.e. dependent on the environment (or the teaching staff), such as the use of online teaching materials (*eresources*) have negative values on dimension 1. Preliminarily, with reference to earlier definitions (see Ashleigh et al., 2012; Chipulu et al., 2011; Ojiako et al., 2011a, 2011b, 2013), we interpreted dimension 1 as an indicator of *transferable skills*.

Dimension 2: 'Online Materials Usage': All the variables measuring the use of online learning materials (*eresources*) have positive valued coordinates on dimension 2, as do two of the variables measuring the extent to which students were able to handle their workload (*workload_1, workload_2*). On the negative side we notice that there are large coordinates for variables that represent situations of active learning (*active_participate*) and adaptability (*adapt_more*). We think therefore that dimension 2 represents non-interactive *online materials usage*.

Dimension 3: 'Analytic Skills': On further inspection of Table 3, one can see many similarities between dimensions 1 and 3, with a number of variables equally signed for both dimensions. Thus, to study both dimensions further, we examined the projection of the MDS structure in dimensions 1 and 3, presented as figure 3 below. We believe that dimensions 1 and 3 represent *a plane of transferable skills* because all the variables in the first quadrant of figure 3 represent transferable skills.

(INSERT FIGURE 3 HERE)

The contrast between dimensions 1 and 3 is revealed by looking at the variables that have a large coordinate value in one dimension and a relatively smaller one in the other: Although problem solving (*prob_solve_general*) has very large values in both dimensions, it can be seen that in this projection of the dimensional structure, it is more strongly related to dimension 3 than dimension 1. It can also be seen that both being more adaptable (*adapt_more*) and being able to adapt ideas (*adapt_views*) have their highest coordinates on dimension 3. These skills are related to problem solving, critical abstract evaluation (Heneman, 1999) and problem conceptualisation (Whitley, 1989). We think, therefore, that dimension 3 represents a specific type of transferable skill, namely *analytical skills*. There is much more variance in the loci of the variables that represent transferable skills vis-à-vis dimension 1; indicating lack of specificity and so we retained our original label of *transferable skills* for dimension 1.

4 and 5) Dimensions 4 and 5: 'In-class Collaboration' and 'Out-of Class Collaboration': It is difficult to separate dimensions 4 and 5 as there are many similarities between them. Above we present Figure 4, which shows the projection of the structure in dimension 4 and 5.

(INSERT FIGURE 4 HERE)

The variables representing cooperative learning situations (*cooperative_1 and cooperative_2*) have large positive coordinates in both dimensions. This is also true for variables *interperson_3* (= 'I feel a strong sense of belonging to my class group') and *interperson_4* (= 'I frequently work together with others in my classes'). This suggests that both dimensions are indicative of situations when students experience *collaborative learning*. There are differences, however. One is that both *critical_4* = ('I have been challenged to come up with new ideas') and

ICT_info_communi = ('I have learnt more about using computers for presenting information') are strongly and positively related to dimension 4, unlike dimension 5. The other is that both *active_mtd_variety* (= 'My academic instructor/s use a variety of teaching methods') and *active_participate* (= 'Students are given the chance to participate in classes'), measures representing situations when teachers initiate student participation, have much larger negative values for dimension 5 than 4. Finally, we note that *cooperative_1* (= 'I have frequently discussed ideas from courses with other students out-of-class') presents its highest positive value on dimension 5. Given these observations, it is our conclusion that dimension 4 represents *in-class collaboration* while dimension 5 represents development of *out-of class collaboration*.

Dimension 6: 'Curriculum Balancing': All the variables representing the use of virtual learning environments have large positive coordinates on dimension 6. This is contrasted by the negative values presented by measures of teaching for deeper understanding, namely the students' experience of feedback and variety in teaching methods. We think that dimension 6 represents the divergent demands of designing a curriculum that encourages deeper learning (resource-hungry) and the use of virtual learning environments (resource-efficient). We therefore labelled dimension 6 *curriculum balancing*. The fact that *workload_3* (= 'I generally had enough time to understand the material on the course') presents its highest coordinate value on dimension 6 supports the interpretation that curricular design must allow time for students to understand the material. The pattern of variable coordinates on dimension 6 is similar to dimension 2 but there is a key difference: the coordinates of usage of virtual learning environments are all high and positive on dimension 6, not so on dimension 2. We think this difference reflects the fact that effective usage of virtual learning environments requires higher level design (by the instructor) such that the VLEs are integrated and aligned with the rest of the curriculum and intended course outcomes. The effectiveness of online learning materials

(dimension 2), on the other hand, does not necessarily require higher level integration at the design stage of the curriculum.

4.3 Dimensional Salience: Management versus Engineering Students

Table 4 shows the salience management and engineering students attach to each of the six dimensions, the overall relative importance of each dimension and how specific each group of students is. The 3-way MDS dimensions are extracted hierarchically.

(INSERT TABLE 4 HERE)

The overall relative importance- based on the amount of variance each dimension accounts for- is greatest for dimension 1 and falls sequentially. The importance of dimension 1 is clear; and, though decreasing, the levels of importance of dimensions 2 to 4 are comparable. However, dimensions 5 and 6 are markedly less important than the preceding four. To a teacher it would appear incongruous that *online materials usage* (dimension 2) is seen as much more important than *curriculum balancing* (dimension 6) but this may in fact be the case from the *point of view of students*, who may have a much lower appreciation (than teachers) of the importance of curriculum balancing when designing courses and may, consequently, be relatively more appreciative of the end results of such designs such as online learning materials.

The dimension weights measure the level by which each group of students discriminates along each dimension: the greater the weight, the more the group discriminates along that dimension so that weight differences across dimensions capture the relative salience the group places on the dimensions. It can be seen that there are *marked differences* in the relative salience each discipline places on the dimensions. Engineering students regard dimension 1 (*transferable skills*), dimension 5 (*out-of class collaboration)* and dimension 6

(*curriculum balancing*) with much more salience than the other three dimensions. Most remarkably, engineering students do not appear to discriminate on dimension 2 (*online materials usage*). In contrast, Management students regarded dimensions 2 (*online material usage*), dimension 3 (*analytical skills*) and dimension 4 (*in-class collaboration)* with much greater salience than engineering students, although the relative differences in their regard for dimension 4 are not as large as those for dimensions 2 and 3.

The 'specificity' indicates how atypical a group of students is, on a scale of 0 to 1: Specificity would be 0 if the group placed equal weight on all dimensions and 1 if the group placed all the weight on one dimension and none on the others. In this case both groups are moderately specific, engineering more so.

4.4 Pro-fit Results

Finally, we examined the Pro-fit results, shown in Table 5, in order to explore the relationships between student characteristics and the six dimensions obtained from *MDS*.

(INSERT TABLE 5 HERE)

Based on the adjusted *R*-square values of the regression models, ranging from 0.35 to 0.61, we can conclude that students' experiences of learning project management are likely to be influenced by five demographic variables (i) gender, (ii) program (level) of study, (iii) university, (iv) prior study of project management and (v) prior work of project management. However differences exist in the salience attached to the six dimensions between the two groups of students; Management students attach higher salience than engineering to the use of online materials, development of analytical skills and in-class collaboration. In contrast, engineering students place more salience on the development of transferable skills, out-of class

collaboration and curriculum balancing. Results also show that relationships exist between how the students experience the six dimensions of project learning with their gender, university, prior study of project management, prior work of project management and, most interestingly from an andragogical perspective, program (level) of study (Colbert et al., 2000; Dacko, 2006), a finding which replicates earlier studies by Chipulu, et al. (2011) and Ojiako, et al. (2011a, 2011b, 2013). In summary, these results suggest students experiences of project management learning are likely to exhibit not only *universality* (along the six dimensions); but also *discipline-dependent specificity* on the importance attached to the dimensions *and* variations in the levels of the experience as a result of individual and background characteristics.

5. Discussions and implication of findings

In understanding the implications of our findings through an andragogical lens, we found that gender specific differences had the strongest relationship with the six dimensions, that is; (i) 'transferable skills', (ii) 'online materials usage', (iii) 'analytical skills', (iv) 'in-class collaboration', (v) 'out-of class collaboration' and (vi) 'curriculum balancing'. These results are not surprising as research suggests (e.g. Lindgren and Packendorff, 2006), that emphasising clear delimitation of work enforces a strong gender bias in project management.

Within education literature circles, interest in andragogical congruence has primarily been driven by realisation that increasingly diverse student cohorts pose new challenges for educators (see Boatwright, et al. 2009). In particular, the recognition that students' learning is influenced by demographic factors (Garcia et al., 2009; Cassidy, 2012), such as gender (Jenkins and Holley, 1991; Chen and Tsai, 2007; Wang et al., 2011) and an acceptance that the project management profession remains largely male dominated (Thomas and Buckle-Henning, 2007), call for a gender responsive andragogical imperative that seeks to consciously ensure that students, irrespective of gender, fully benefit from their learning experience. The notion of a

gender responsive andragogical imperative in project management however faces a number of challenges. For example, it relies on beliefs that suggest essential or cognitive differences exist between male and females (Rowan et al., 2002; p. 29), which according to Martino and Kehler (2007), imposes conceptual limitations on how to deal with academic under-achievement. In some instances, Martino and Kehler (2007) suggest that a number of scholars have suggested that the existence of gender based differences in teaching and learning serves as justification for example for single-sex classes or different assessment models for male and female students.

The reality however is that research gender effects on learning expectations, experiences, and learning approach preferences remains inconclusive. For example, Besterfield-Sacre et al. (2001) and Hutchison-Green et al. (2008), suggest a strong discipline gender effect on teaching and learning experiences. Similarly, research by Reis (1998) suggest that male students are more likely to associate academic success to personal ability and subsequent failure to a lack of effort than female students who are more likely to associate their academic success to either effort or in some instances, luck. Female students are also more likely than male students to attribute failure to their lack of ability (Reis, 1998). Wang et al., (2011) attributes such strong discipline gender effect to bias within some disciplines. It is also important to highlight the existence of studies that have no supported gender biases on learning expectations, experiences and learning approaches. These studies include that of Jenkins and Holley (1991), Tekinarslan (2008), Rahman et al. (2012), and Grace et al. (2012).

What then are the implications for a gender responsive andragogical imperative in the teaching and learning of project management? We believe that there are implications not only in the way that project management is taught but also in its curriculum. Specifically it is important to consider a number of factors which includes choice of case study examples when developing a gender responsive curriculum of project management. For example, utilising case studies that reinforce gender bias may only serve to enhance low self-efficacy which has been

supported by research to exist among some female engineering students. (Besterfield-Sacre et al., 2001; Hutchison-Green et al., 2008) From a general perspective, we will expect a gender responsive andragogical imperative in the teaching and learning of project management to encompass the following attributes; (i) undertaking curriculum changes that mitigates against gender based boys' interests and learning styles, (ii) training project management educators to minimise the reinforcement of dominant masculinity. These two points imply the necessity of training project management educators to minimise unconscious gender framing of students. The implication of such framing is usually observed for example in grading and assessment (Martino and Kehler, 2007). We also expect a gender responsive andragogical imperative to (iii) break down gender based power-networks and hierarchies within project management that tend to enforce strong gender bias within the profession. From an andragogical perspective, we therefore argue that congruence does not imply adjusting modes of instruction to align with gender specific challenges.

6. Conclusion

This paper contributes to the literature on project management learning. The study sought to develop an understanding of what the key dimensions of students' experiences of project management learning are and what salience students attached to such dimensions. The study is placed within such initiatives as the UK government research-council funded 'Re-thinking Project Management' initiative. We interrogated extant teaching and learning literature leading to the development of a proposition that current literature was yet to examine student's saliences against key dimensions of their experience of project management learning. Although our results showed that students' experiences of learning project management are likely to be influenced by five demographic variables (i) gender, (ii) program (level) of study, (iii) university, (iv) prior study of project management and (v) prior work of project management,

a possible factor that may have impacted the findings of the study relates to whether teaching and learning or other educational differences existed across the four institutions sampled. In particular could be differences in the amount and nature of individual and team assignments and assessments. For example an important consideration for team assignments could be whether students are permitted to self-select their teams or are assigned to specific teams by instructors to in order to maximise or in some cases minimise diversity.

With the increased recognition of accrediting bodies on the importance of research related to educational methods, studies on teaching and learning in project management that offer recommendations for improvement will be of great benefit to the profession. Although we believe that the study should be of immediate use to educators and human resource managers in project management, we are also aware that the research could be extended. A clear possibility for future research would be to explore whether the results could be replicated in different national settings and findings generalised. The authors are currently gathering relevant data to undertake such work. Future studies may also focus on examining whether andragogical congruence has an impact on not only students learning experiences, but on learning outcomes measured for example through comparative assessment results, comprehension and appreciation. Additional research may also be needed to determine whether earlier findings by Pant and Baroudi (2008) relating to the emphasis of hard skills in project management education are is still relevant. The question of practical appreciation is also of particular relevance to a practice based discipline such as project management. Evidence of these will have to be achieved through the collection of the relevant empirical data.

In conclusion, a study that seeks to examine the notion of andragogical congruence within project management represents an important means of not only informing, but also updating key stakeholders and immediate beneficiaries such as academia, industry and professional institutions on the challenges (and opportunities) of a gender responsive

competency development framework. For institutions of higher learning that offer courses in project management, acknowledgement of such a framework implies that the teaching and learning of project management is framed around models that are sensitive and response to challenges the profession is currently facing. One such challenge is the tendency of the profession to reinforce gender bias. Andragogical congruence also implies that academia lays greater emphasis on creating the right environment to counter such bias and we highlighted three possible strategies that academia may pursue to achieve this. For industry that employ project managers and professional project management institutions that provide guidance on competency expectations, the findings of this study may be seen to represent an indicative guide on current competency expectations of future practitioners. Such awareness provides a major opportunity for professional institutions and bodies to arrest the possibility of competency gaps through exemplar mandates that are aligned with teaching and learning strategies.

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