HOLISTIC LEARNING: A WORKFORCE DEVELOPMENT PARADIGM

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ABSTRACT

The development of workforce knowledge, skills and attitudes are widely acknowledged in extant literature as being pivotal levers to deliver process improvement and efficiency. The success of an organisation depends as much on its technical system as on the social system that supports it. Strategies for improving organisational performance need to incorporate arrangements for developing the workforce competences required to implement strategy. Lean construction by definition involves continuous small-step improvements (Kaizen), problem solving and employee involvement at all levels. The argument for providing workplace systems that support life-long learning within construction businesses therefore takes on greater significance. This paper reports on the pilot for a wider research aimed at firmly linking construction businesses to the learning domain. The pilot involved a survey of domain experts (276) which sought to characterise the Nigerian construction industry in terms of its knowledge and learning requirements, the supply systems for construction skills, the individual attributes required for optimal performance, and the appropriate pedagogical approaches for learning construction skills. Findings to date suggest that the Nigerian construction industry exhibits many characteristics of Taylor-Fordist systems but with tendencies towards knowledge-based systems suggesting the need for improved systems of learning. The training systems of construction firms were found to supply a small percentage of skilled workers to the industry pool, but the few were perceived to be the most competent. Construction skilled workers were perceived to require not only cognitive but also emotional and social competencies for optimal performance. This paper posits that the construction industry needs to align its skill provision systems with modern learning theory to create effective learners and learning environments within organisations to drive the learning needed for performance and innovation. The paper proposes the development of a conceptual model which captures the key elements of an effective skills learning solution for construction.

***Keywords**: construction skills; learning, learning organisation; performance; construction industry*

1. INTRODUCTION

The underlying philosophy of the Toyota Production System (origins of lean practice) is that the technical system of an organisation alone does not make products but needs to be supported by a social system of people interacting to improve performance through the continuous positive learning that underpins steady small-step improvements and innovation (Lander and Liker, 2007). The argument for improved workplace learning systems to support individual life-long learning in context therefore takes on greater significance. Learning in the workplace happens in the dynamic encounter between the employee's learning processes and 3 aspects of the workplace: the learning environment of the workplace; the communities of practice at the workplace; and the enterprise as technical-organisational system (Illeris, 2004). The challenge for workforce development is therefore twofold: developing effective learners and creating suitable learning environments.

Individual workers require more than cognitive attributes to learn effectively and to perform optimally. Modern learning theory postulates that individual learning is a holistic process of continuous adaptation to views and contexts where competence is made up of more than mere knowledge and skills. For instance, mental energy, feelings and motivations should be conducive for learning and performance. Individuals also need the abilities for social interaction to learn and to perform. Learning is therefore viewed as a life-long process involving an individual with both cognitive and emotional dimensions interacting continuously with a social dimension which they affect and are affected by (Hagar; 2008; Illeris 2007; Kolb, 2004). Studies have shown that these attributes can be learned and they can be developed (Illeris 2007). Learning organisations are characterised as: organisations that create continuous learning opportunities; promote enquiry and dialogue; encourage collaboration and team learning; establish systems to capture and share learning; empower people towards collective vision; and connect with the organisational environment (Fenwick, 1996). Understanding the construction environment is integral to understanding the requirements for knowledge and consequently for learning in that environment. The changing nature of work, of knowledge and of required skill sets drive the learning process for an industry. This becomes particularly critical in knowledge-based societies with the greater emphasis on knowledge construction and lifelong learning (Kostos, 2006; Vaughan, 2008). Pre-industrial systems of work required practical knowledge and traditional apprenticeships provided an adequate learning system. Industrial Age systems of work, often described as Taylorist-Fordist systems, required both propositional and practical knowledge and schools were organised to

structure and package knowledge and deliver it to people mostly along the lines of mass production principles (NZCER, 2014). The transition to the Knowledge Age (Trilling, 2001) has brought about changes in industry marked by movement from Taylorist-Fordist systems of mass production dependent on narrowly defined tasks and strict divisions of labour (Cullen, 2002; Dankbaar, 1999) to knowledge-based systems where organisations are characterised by greater use of technology, flatter hierarchies, less supervision, more responsibility and authority at lower levels, employees deployed across functions and departments, multi-skilled workers who are also expected to multitask. Organisations are now expected to be leaner with better motivated workforces that are more productive, innovative, effective and efficient (Ardichvill, 2003). This suggests that new learning paradigms both at school and beyond school may be required (Kostos, 2006). A paradigm in this context refers to a model or framework incorporating concepts, theories, methods and standards for the learning of construction skills. Literature on construction skills education and training has focused mainly on the competence v. knowledge debate and the location of learning debate (school v. work place). The views on either end of these divides dwell on the dialectic of behaviourism and cognitive learning theories which contemporary learning paradigms have moved away from to embrace more holistic and integrated views. Holistic learning is characterised by focus on the 'whole person', and seeking to engage fully all aspects of the learner: cognitive; emotional; and social. The underlying holistic principle is that an organism functions most effectively when all its component parts are themselves functioning and cooperating effectively (Jarvis and Parker, 2007; Welford, 2015). There appears to be a need to build up from first principles new systems of learning for constructions skills based on holistic learning and appropriate pedagogy with due consideration for the dynamic nature of knowledge and life-long learning requirements of knowledge economies.

2. RESEARCH METHODOLOGY

This paper presents part of a wider on-going research aimed at developing a dynamic conceptual skills training model that enables construction firms to optimise individual worker performance by integrating effective and efficient learning approaches into the firms existing business models.

The first phase of the study set out to identify the core issues involved in designing effective learning solutions for construction skills in line with contemporary learning theory. The literature review covered three main research areas: learning, education and training; the construction industry context; and construction business strategy. An objective of the review was to bring together these three research areas to identify the attributes (knowledge, skills and attitudes) of an ideal skilled worker in the construction industry, the appropriate learning approaches that can deliver these attributes within a construction firm while aligning learning with the firm's business strategy. The two main online sources used to collect articles were Ebscohost and Google Scholar. Specifically, this involved comprehensive searches within Academic Source Complete; Business Source Complete, ERIC, Humanities International Complete; PsycARTICLES and SocINDEX. Related full text papers in peer reviewed journals in English were included. These were complemented with references in the papers to other work; author searching; and checking citation information to expand review backwards and forwards. The constructs and sub-constructs identified for further study are: *Nigerian construction industry* - production processes and impact on knowledge requirements and the quality and ratios of construction skilled workers supplied to industry pool by education/training providers; *individual worker* - attributes **(**cognitive, emotional, and social) and performance; and *construction organisation learning framework* - strategic direction, knowledge management, learning content, social and motivational context, pedagogical approaches and resources.

The second phase involved a pilot study based on this review which sought to characterise the construction environment in Nigeria for knowledge requirements and skills provision; to identify the significant individual attributes required for optimal performance; and to establish the appropriate contexts for the delivery of construction skills. A questionnaire survey of the domain experts in the Nigerian construction industry was considered the most appropriate tool for data collection due to the large sample size and their spatial dispersion across Nigeria. A proportionate stratified random sampling method was used to select the domain experts drawn from construction firms, professional groupings and educational institutions to participate in the study. The purpose was to obtain a sample that resembles as closely as possible the population from which it was drawn (De Vaus, 2014; Leedy and Ormond, 2010).The population for domain experts was made up of the following databases: Architects Registration Council of Nigeria (architects); Council for Registered Builders of Nigeria (builders); Council for the Regulation of Engineering in Nigeria (civil engineers, electrical engineers, and mechanical engineers); Quantity Surveyor's Registration Board of Nigeria (quantity surveyors); Federation of Construction Industry, Nigeria (construction managers and site supervisors); National Board for Technical Education and National Business and Technical Examination Board regulated institutions (educators and trainers). The strata of the 276 valid responses obtained were found to be significantly consistent with the population strata. The questionnaire developed for data collection comprised of the following: 8 items measured perceptions of industry character on a 4-point Likert scale (4 = strongly agree, 3 = agree, 2 = disagree, and 1 = strongly disagree),

10 items assessed perception of provision of construction skilled workers to industry pool by 10 education and training providers in terms of quantity using a 4-point Likert scale while the 10 providers were scored for quality (using a 10 point scale). The 10 most significant attributes for individual performance of construction skills were identified then ranked and rated (using a 4-point Likert scale) from a randomised list of 26 attributes. 55 items rated learning approaches and contextual issues for learning effectiveness on a 4-point Likert scale. The 10 most effective teaching methods for construction skills were identified then ranked and scored (using a 5 point scale) from a list of 15 methods while the 10 most significant criteria for evaluating performance were identified, then ranked and rated (using a 4-point Likert scale) from a list of 12 criteria. Data was analysed using descriptive statistics such as mode, mean and standard deviation.

3. FINDINGS

The study found that the Nigerian construction industry exhibits many of the characteristics of Taylor-Fordist systems identified from literature such as strict division of labour (3); workers not taking responsibility for the quality of their work (3); low use of technology (3); high levels of supervision (3); and also the need for middle level management on construction sites (3). Construction organisations also show some tendencies towards knowledge-based systems to the extent that construction workers are multi-skilled (3); they carry out a variety of tasks on construction sites (3); and are allowed authority to make decisions concerning their specific area of activity on construction sites (3) (Cullen, 2002; Dankbaar, 1999). Current requirements for knowledge appear to be Taylor-Fordist but the tendencies towards knowledge-based systems may be significant for the future. The study found that construction firms are perceived to provide the most effective training for construction skills in Nigeria (7.04). This agrees with studies in other countries which found that the construction sites are perceived to provide the best location for construction skills learning (Abdel-Wahab, 2012; Harris, *et al*, 2001; Wang *et al*, 2010). A viable opportunity for improving construction skills provision in Nigeria through work-based learning strategies within construction firms may therefore exist. In addition cognitive attributes (technical skill (3.91), underpinning knowledge (3.79) and numeracy skills (3.58)), emotional attributes (motivation (3.52), creativity (3.5) and craftsmanship (3.38)) and social attributes (communication skills (3.25), business-like attitudes (3.2) and social skills (2.89)) where perceived to be significant for effective learning and optimal performance of construction skills. This suggests that holistic and integrated learning systems designed for construction businesses are likely to produce effective learners who perform optimally in line with the organisations' business strategy. Figure 1 shows the key elements of a proposed learning and performance optimisation solution for construction organisations. Optimisation refers to saturation i.e. where no 'tangible' improvement can be leveraged regardless of level effort expended (beyond optimal point). It incorporates effective learners interacting with a construction firm's learning environment to deliver continuous improvement, optimal performance and innovation. From literature effective learners engage with their cognitive, emotional and social learning dimensions and findings to date support this. Further empirical investigations in this area are on-going and will be reported at a later time.

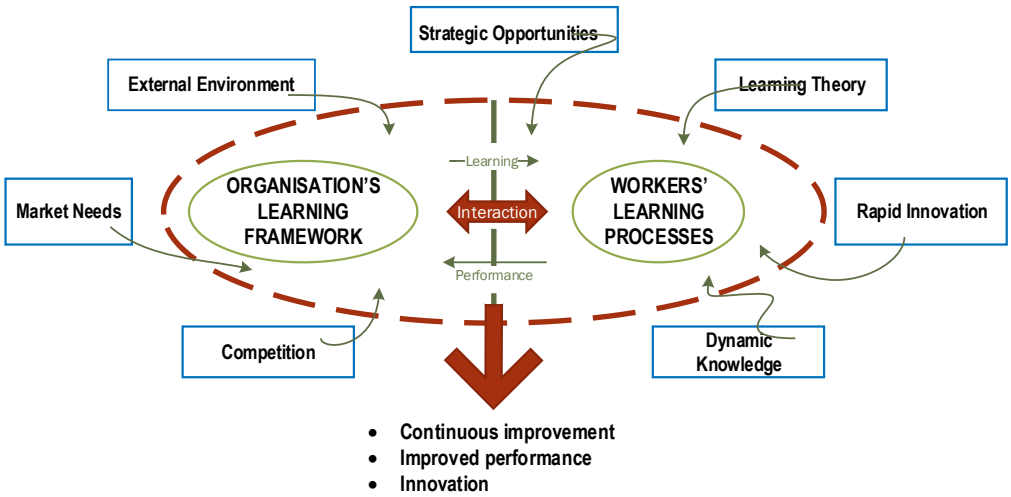

Figure 1: Learning and performance optimisation solution for construction firms

4. CONCLUSION

This paper posited that placing learners within a learning environment specifically designed to align with an organisation's business goals can help ensure that skills are continually aligned to an organisation's business needs. This can help create an organisation that is able to learn and grow (continuous improvement) and be more

innovative. Innovation in this sense refers to an organisation's ability to be creative and agile (vis-à-vis the use of its skill sets) within a business setting. Effective learners and performers are workers who have, not only knowledge, technical and numeracy skills but are also motivated, able to solve problems creatively and to generate new ideas, possess pride in their work, 'own' the businesses in which they are employed, are able to communicate effectively, are able to work well in teams and are able to interact positively with others. These attributes can be learned and/or developed in areas where deficiencies exist. There is a need for construction organisations to transform into learning organisations that: create continuous learning opportunities; promote enquiry and dialogue; encourage collaboration and team learning; establish systems to capture and share learning; and empower people towards collective vision. To meet this need, the wider research aim is to develop a dynamic conceptual skills training model that enables construction firms to optimise individual worker performance by integrating effective and efficient learning approaches into the firms existing business models. The next steps to this study were: to empirically determine the individual attributes that impact on learning and performance within the construction firm environment; to map the essential attributes to the learning methods and pedagogical approaches that will deliver them optimally within construction organisations; to determine the learning organisation framework appropriate for construction businesses; and to develop, test and validate a dynamic conceptual skills training model that enables construction firms to optimise worker performance by integrating effective learning approaches into the firm's existing business models.

4. REFERENCES

Abdel-Wahab, M., (2012) "Rethinking apprenticeship training in the British construction industry", *Journal of Vocational Education & Training*, Vol. 64, No. 2, pp. 145-154

Ardichvill, A. (2003) "Constructing socially situated learning experiences in human resource development: an activity theory perspective", *Human Resource Development International* Vol. 6 No. 1, pp. 5-20.

Cullen, J., Hadjvassiliou, K.; Hamilton, E., Kelleher, J., Sommerlad, E., and Stern, E. (2002) *Review of current pedagogic research and practice in the field of post compulsory education and life-long learning*, (Final report submitted to the Economic and Social Research Council), London: The Travistock Institute

Dankbaar, B. (1999) "Training issues for the European automotive industry, *Industrial and Commercial Training"*, Vol. 31. No. 5, pp. 174-181

De Vaus, D. (2014) *Surveys in Social Research*, 6th Ed, Oxon: Routledge

Fenwick, J. T. (1996) "Limits of organisational learning: a critical look", Antigoush, Nova Scotia: ERIC

Hager, P. (2008) "The competence affair, or why vocational education and training urgently needs a new understanding of learning", *Journal of Vocational Education and Training*, Vol. 56 No. 3, pp.409-433,

Harris, R., Willis, P., Simons, M. and Collins, E., (2001) "The relative contributions of institutional and workplace learning environments: an analysis of apprenticeship training" *Journal of Vocational Education and Training, Vol.* 53 No.2, pp. 263-278

Illeris, K. (2004) "A model for learning in working life", *The Journal of Workplace Learning*, Vol. 16 No. 8, pp. 431-441,

Illeris, K. (2007). *How We Learn: Learning and non-learning in school and beyond*, Routledge, London

Jarvis, P. and Parker, S. (2007) "Preface" in *Human Learning: An Holistic Approach*, Jarvis, P. and Parker, S. eds, London: Routledge

Kolb, D. A. (1984) *Experiential Learning: Experience as the Source of Learning and Development*, Englewood Cliffs NJ: Prentice Hall

Kostos, C. (2006) "Learning in the knowledge age, where the individual is at the centre of learning strategy and organisational success." *Australian Journal of Adult Learning*, Volume 46 No. 1, pp. 75-83

Lander, E. and Liker, J. K. (2007) "The Toyota production system and art: making highly customised and creative products the Toyota way", *International Journal of Production Research*, Vol. 45 No.16, pp. 3681-3698

Leedy, P. D. and Ormond, J. E. (2010) *Practical Research: Planning and Design*, 9th Ed., New Jersey: Pearson Education International

New Zealand Council for Educational Research (NZCER) (2014) "The knowledge age", *Shifting to 21st Century Thinking*. Viewed at www.shiftingthinking.org on August 21, 2014

Trilling, B. & Hood, P. (2001) "Learning, technology, and education reform in the knowledge age or "We're wired, webbed, and windowed, now what?"" *Learning, Space and Identity*, Paechter, C., Edwards, R., Harrison, P. & Twining, P. T. eds, SAGE, London, pp. 7-30

Vaughan, K. (2008) "Workplace learning: A literature review", *New Zealand Council for Educational Research*. Viewed at www.akoaotearoa.ac.nz on August 11, 2014

Wang, Y., Goodrum, P.M., Haas, C., Glover, R. & Vasari, S., (2010) "Analysis of the benefits and costs of construction craft training in the United States based on expert perceptions and industry data", *Construction Management and Economics, Vol.* 28 No. 12, pp. 1269-1285

Welford, J. (2009) "Holistic learning". Retreived from J.Weford.demon.co.uk/brainwaremap on May 29, 2015