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Modelling graduate skill transfer from university to the workplace

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Modelling graduate skill transfer from university to the workplace

Abstract

This study explores skill transfer in graduates as they transition from university to the workplace. Graduate employability continues to dominate higher education agendas yet the transfer of acquired skills is often assumed. The study is prompted by documented concern with graduate performance in certain employability skills, and prevalent skill gaps across developed economies. Using confirmatory factor analysis and structural equation modelling, it models skill transfer in 674 business graduates from 39 different Australian universities. Findings support extant literature with the three areas of learner, learning program and workplace characteristics influencing transfer. The model highlights the need for a more process-oriented, rather than outcomes-focused, approach to the acquisition and transfer of skills in graduates and the shared responsibility of transfer among stakeholder groups. There is a lack of variation among different graduate groups which suggests a generic model of skill transfer and intervention strategies for educators and employers may be implemented as best-practice. Ultimately, graduate employers will enhance their investment return on new recruits; educators are more likely to achieve goals of work-readiness; and individuals will benefit from career progression and intangible rewards associated with improved performance.

Key words

Transfer, employability, graduate, business, skill, curriculum

Introduction

The transfer of learning has attracted significant attention in recent years with Blume et al. (2010) noting inconsistencies in findings and empirical approach. Existing studies predominantly focus on measuring the tangible returns of corporate training as learners translate their acquired skills and knowledge back to their job roles; in addition to clarifying factors which influence the transfer process. Studies typically identify learner, learning program, and workplace characteristics as the main determinants of transfer; producing a range of training transfer models (see Kirwan and Birchall, 2006; Leberman, McDonald, and Doyle 2006). Derived from these are recommended strategies for human resource (HR) professionals on recruitment, learning program delivery, and job design; each aiming to yield greater returns on the acquisition, retention and transfer of skills in the workplace.

There has been far less attention to the transition of graduate skills and knowledge from university to the workplace, with only a limited number of relevant studies (Ettington and Camp 2002; see Leberman et al. 2006). It appears that skill transfer is either assumed by key stakeholders in undergraduate education (Leveson 2000) or educators have assigned this challenging area of learning theory (Hakel and Halpern 2005) to the proverbial 'too hard basket'. Given the global spotlight on graduate employability and industry expectations of their ability to perform immediately in roles across different sectors and organisation types, the lack of interest in graduate transfer is surprising. Prominent graduate employability models (Dacre-Pool and Sewell 2007; Yorke and Knight 2004) typically focus on the development of certain non-technical, or employability, skills to achieve graduates work-readiness. Initiatives for skill development in higher education largely focus on embedding skill outcomes into core curricula and improving access to service and work-integrated learning. Although the skills agenda in higher education may be considered political (Young

2009) and is resisted by some educators (Pegg, Waldock, Hendy-Isaac and Lawton 2012), it continues to gain momentum on the back of industry calls for high performing graduates who are equipped with skills and knowledge beyond disciplinary expertise.

Persistent industry criticism of higher education efforts in producing work-ready graduates and evidence of poor performance in certain employability skills in some developed economies (see Jackson and Chapman 2012a) urge empirical examination of skill transfer in graduates. Some may attribute industry dissatisfaction with graduate skills to a disparity in educator and professional practitioner understanding of precisely which skills are important, to what standard, and resulting differences in those developed in core curricula to those required for professional practice (Jackson, Sibson and Riebe 2013). Documented deficiencies may, however, be at least partially caused by graduate inability to transfer acquired skills and knowledge to application contexts beyond the university classroom.

Learning transfer

Learning transfer is the transition of acquired skills and knowledge across different contexts. Near transfer is where the context in which skills and knowledge were acquired is similar to that in which they will be applied. Far transfer concerns the transition of skills and knowledge across different contexts (see Barnett and Ceci 2002). As the workplace and university classroom are culturally unique (see Candy and Crebert 1991), graduate transfer forms an acute example of far transfer. Given the complexities of employability skills and the nature of typical workplace tasks, graduate transfer is a form of ‘high road’ or ‘mindful’ transfer (see Leberman et al. 2006) which is not automatic and requires conscious effort.

Existing models broadly identify three domains - learner, learning program, and workplace characteristics - which influence an individual's ability to transfer across contexts (see Kirwan and Birchall 2006). The difficulties in measuring transfer are widely acknowledged (Taylor, Russ-Eft and Taylor 2009) and impact profoundly on our understanding of the actual transfer process (Hakel and Halpern 2005). Theories on how transfer occurs fall into two broad categories: those focusing on the role of cognitive processes and what is 'transferred out' of a learning context, and those concentrating on the learner 'transferring in' an aptitude and ability to problem solve, make connections with prior learning, and manage the changes presented by different application contexts (see Jackson and Hancock 2010).

Developing a clear understanding of what determines transfer forms an initial, and highly beneficial, step in unpacking this complex area of learning theory. It will assist in identifying collaborative strategies for managing determinants of transfer to enhance work-readiness and workplace performance (Jackson and Hancock 2010). Poor performance is particularly evident in graduate ability to communicate and problem solve (Hancock et al. 2009) and in their customer awareness, cultural understanding, and self-management skills (Confederation of British Industry [CBI] 2011). Nurturing learning within organisations is vital for staff recruitment and retention; change management cultures and nurturing effective leaders and promotes organisational excellence by strengthening staff skill profiles (Holton and Baldwin 2003). In addition to easing skill deficiencies and enhancing productivity and competitiveness, it may curb industry dissatisfaction with higher education skill outcomes and augment graduate personal satisfaction and career progression.

The study aims to enhance our understanding of those factors which influence the transfer of skills from the university classroom to the workplace. It tests a proposed model of skill

transfer by investigating the transition of oral communication skills in business graduates from all 39 Australian universities to a range of different work environments. Business graduates were selected due to ongoing concerns for their work readiness in developed economies (see David and David 2010) and oral communication, a critical skill and the most examined in the graduate selection process (Australian Association of Graduate Employers [AAGE] 2011), due to consistent disparities between higher education provision and industry expectations (Australian Industry Group 2008; Hancock et al. 2009). The model will identify intervention strategies for enhancing skill transfer and provide a tool for comparing graduate skill application and performance in different work areas. This study will be of interest to other culturally-similar developed economies, such as North America, New Zealand and parts of Europe, which have similar documented gaps in oral communication skills (CBI 2011; Milner 2007; Hart Research Associates 2006).

The research objectives are: (i) to investigate whether graduates show significant differences in their ability to apply oral communication skills at- and post-graduation and identify any variations by demographic and/or work background characteristics (ii) to test the proposed model and assess whether – and to what extent - learner, learning program and workplace characteristics influence graduate skill transfer; and (iii) to recommend stakeholder strategies on enhancing graduate skill transfer. The paper is structured to first present a proposed model of graduate transfer based on existing literature, followed by an outline of methodology and a discussion of findings and implications for stakeholder groups.

Proposed model of graduate transfer

Figure 1 presents the proposed model of skill transfer. It derives from extant literature and hypothesises that graduate skill transfer is a function of learner, program and workplace

characteristics. Only a brief discussion of each domain is provided, see integrative literature reviews for more detail (Blume et al. 2010; Burke and Hutchins 2007), as the focus is more on departure points from existing models when adapting to the graduate context.

Learner characteristics

Personality disposition significantly influences learning transfer (Herold et al. 2002). Particularly relevant are the individuals' willingness to take risks (Bereiter 1995), self-esteem (see Lim and Morris 2006), self-confidence in learning and applying skills and knowledge (Kirwan and Birchall 2006) and cognitive ability (see Burke and Hutchins 2007). Further is their motivation to learn (Holton, Chen, and Naquin 2003), influenced by personality (Warr, Allan, and Birdi 1999), clear expectations of learning outcomes (Kirwan 2009), locus of control (Colquitt, LePine and Noe 2000) and perceptions of workplace support (Austin et al. 2006).

Although Noe (2000) argues personality characteristics should be omitted from transfer models as it cannot be collaboratively altered by stakeholders, some believe personality is malleable during university years (see Villar and Albertin 2010). Although receiving comparatively little attention in existing transfer models (see Herold et al. 2002), learner characteristics feature in the model due to their documented importance (see Burke and Hutchins 2007). Here, the Big Five personality dimensions of 'Openness', 'Extraversion', 'Emotional Stability', 'Conscientiousness' and 'Agreeableness', in addition to the background factor of related work experience (Lim and Johnson 2002), are deemed to adequately capture the learner characteristics domain.

Two factors from existing training transfer models are excluded. First is learner's appreciation of transfer; their understanding of the concept and principles of transfer (Haskell 2001). This is considered more a strategy, within the learning program characteristics domain, for enhancing transfer by adopting a process-oriented approach to undergraduate skill development where students explicitly understand the importance of learning how to acquire and apply certain skills rather than simply achieving performance outcomes. Second, prior learning (Hakel and Halpern 2005) is not included in the model as this is assured by undergraduate program prerequisites.

Learning program characteristics

The graduate model highlights the importance of developing learning scenarios which are similar to the workplace context (Burke and Hutchins 2007) and teaching general theories and principles on the given skill/disciplinary area, or abstract rules (Billing 2007), to better enable graduates to generalise their learning to other scenarios (Ettington and Camp 2002). Here educators should make content more relevant, using applied projects and experimental learning, yet ensure students understand the general principles behind the skills they are developing. Further, reinforcing the relevance of targeted skills (Kirwan 2009) is important as perceived usefulness for attaining career goals (Lim and Morris 2006) and learner perceptions of opportunities for using skills (Chiaburu and Lindsay 2008) are critical to motivation for transfer.

Further, defining and reviewing learning goals and objectives is pivotal to motivation, skill mastery and transfer (Chiaburu and Marinova 2005), as is collaborative learning which integrates significant opportunities for practice and feedback (Ettington and Camp 2002; Hakel and Halpern 2005) and actively engaged learners (Billing 2007; Burke and Hutchins

2008). This is related to fostering learning with understanding to avoid rote learning, particularly unsuited to skill development and subsequent transfer, and allowing the learner sufficient time to absorb material (see Barnett and Ceci 2002). Finally, reflection is a powerful tool for achieving transfer (Burke and Saks 2009) as it enables learners to recognise differences in application and adjust their responses accordingly (Bransford and Schwartz 1999).

Certain program design characteristics identified in training literature are excluded from the model as they pertain to near transfer scenarios. Undergraduates - particularly those in the early stages of study - are often unfamiliar with their skills application context, unlike corporate learners. Examples are emphasizing greater specificity in the application of the learning content to a particular job role and the procedural nature of the trainees' tasks when instructing (Clark and Voogel 1985) and conducting training needs analysis prior to learning (Swanson 2003). Further, certain factors cannot be easily quantified in undergraduate programs, key examples being trainer attributes (Burke and Hutchins 2008); learning whole tasks rather than component skills in isolation (Anderson, Reder, and Simon 1996); and accounting for cultural differences through diverse teaching strategies (Lim 1999).

Workplace characteristics

Learner perceptions of the work environment, such as the extent to which they believe it is supportive (see Chiaburu, Van Dam and Hutchins 2010) and the importance assigned to learning and innovation (see Austin et al. 2006; Awoniyi, Griego, and Morgan 2002), will influence transfer. If the learner believes his or her efforts will result in desirable outcomes, the more motivated they are to learn and, thus, the more likely they are to transfer (Holton et

al. 2003). Also important is the existence of problematic group norms which create resistance to learning transfer (Heaven, Clegg, and Maguire 2006; Holton et al. 2003).

Often considered the most critical workplace factor is the nature of supervisory and managerial support (Burke and Hutchins 2007). Supervisor familiarity with learning program content is important (Austin et al. 2006), yet difficult to achieve in the graduate context. Establishing short and long term learning objectives which flow on from and capitalise on degree program content, including discussion on obstacles in the attainment and application of learning and identifying suitable coping strategies (see Kirwan and Birchall 2006), are critical. Feedback on learner efforts in applying learning in the workplace (Burke and Hutchins 2008) - including peer feedback (Lim and Morris 2006); facilitating a locus of control; flexibility in achieving outcomes and encouraging a sense of ownership in work (Awoniyi et al. 2002) are all important.

Collaborative networks, such as communities of practice and access to peer support in the workplace, determine transfer (Hawley and Barnard 2005). Interventions such as coaching, buddy systems and mentoring which facilitate feedback and reflection on the process of skill application are also beneficial (Thach 2002). Finally, a learner's capacity to transfer is critical and includes a reasonable workload which facilitates experimentation, flexibility and reflection on performance (Broad and Newstrom 1992); sufficient mental, emotional and physical resources for creativity (Awoniyi et al. 2002; Holton et al. 2003); opportunities for practicing newly acquired skills (Chiaburu and Tekleab 2005); and flexibility within the organisation to apply new processes (Lim and Morris 2006).

Method

Participants

The sample comprises 674 individuals who graduated from one of 39 Australian business undergraduate degree program within the previous three years. This time lag was considered acceptable to allow graduates sufficient opportunities to use their skills and accurately rate their workplace performance (see Taylor et al. 2009). All were based in Australia and working in a full-time role. A summary of their work background and demographic characteristics are provided in Table 1. The total number of students who graduated from an Australian Management/Commerce related degree program in 2012 was 53,364, of which 22,520 were domestic students (Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education [DIICSRTE] 2012). The age and gender breakdown of the participants broadly align with the demographic distribution of those attaining Bachelor degrees in 2012 in Australia although there was underrepresentation for those aged between 19 and 21, most likely due to the three year post-graduation sampling parameter.

[Insert Table 1]

Procedures

An online survey was used to gather data on factors influencing skill transfer in Australian business graduates. Graduates working in a range of different industries nationwide were targeted between April and June 2012 in three different ways. First, direct contact was made with Australian graduate employers, identified through relevant websites such as the Australian Association of Graduate Employers, and HR managers asked to disseminate survey information to their business graduates. Second, participating university alumni circulated the survey via direct mail or through their social networking or career websites. Third, professional associations publicised the survey through electronic mail to relevant

members. The percentage of the sample recruited from the three sources, namely direct contact with Australian graduate employers, university alumni body and professional associations is unknown. This cannot be deciphered, given the anonymity of the participants reached using the latter two methods and the possible overlap of targeted graduate employers and professional association member/alumni respondents.

Snowball sampling was selected in order to access the often ‘hidden’ business graduate population. Although this sampling strategy has associated concerns with selection and gatekeeper bias (Atkinson and Flint 2001), this was minimised as recruitment by the initial point of contact – who were not respondents themselves – did not depend on their subjective choice of participants. Instead, recruitment was based on objective criteria, that being graduation from a business-related degree within the past three years and working full-time within the participating organisation. A blanket call was made by HR personnel using electronic email to suitable participants, using databases of graduate recruits, or to their direct line managers/supervisors.

Measures

Table 2 summarises the different sections and questions, predominantly closed, which comprise the survey. The opening section captures data on respondents’ relevant demographic and work background characteristics, followed by data on the dependent skill transfer construct then on the independent variables of learner, program and workplace characteristics.

[Insert Table 2]

Dependent Variable

The dependent transfer construct is assessed by measuring the degree to which graduates perceive they are able to successfully apply their skills in the workplace. This aligns with

Baldwin and Ford's (1988) assertion that for transfer to have occurred "learned behavior must be generalised to the job context and maintained over a period of time on the job" (63). Measures for oral communication skills derive from a competency framework of twenty skills and 45 constituent behaviours developed by Jackson and Chapman (2012b). This framework has been adapted to underpin an employability skills program in an Australian university and the survey items are based upon rubrics which identify sub-behaviours within the behaviours comprising the skill set. Each candidate was asked to rate, on a scale of one to seven, the level best describing their ability to perform behaviours relating to oral communication at both graduation and the time of completing the survey (up to three years since graduation). A rating of one indicates an inability to perform and seven an expert who is able to teach the behaviour to others. Alpha coefficients are indicated in Table 2 and all, with the exception of feedback at the time of graduation, exceed .70. This threshold is widely considered an indicator of reliability although values above .60 are also deemed appropriate for exploratory studies (Hair et al. 2010).

Independent variables

Learner characteristics, as per the hypothesised model, were not predicted to form a latent construct. This was apparent in Holton et al.'s (2000) development of the Learning Transfer System Inventory (LTSI), a relatively established instrument for measuring training transfer. The Big Five personality dimensions were assessed using a brief, yet valid, Ten Item Personality Inventory (TIPI) (Gosling, Rentfrow and Swann Jr. 2003). Related work experience is measured by the number of months worked on a full-time basis since graduation.

For both learning program and workplace characteristics, respondents were asked to indicate, on a scale of one to seven, the extent to which they agreed or disagreed with the items relating to the learning program and workplace constructs (see Table 2). Items were developed from extant transfer literature with particular consideration of the graduate context. The survey instrument was pretested among a small sample of business academics to assess content validity and integrity. Some minor adjustments to the wording of certain questions were made based on their feedback.

Prior to analysis, data screening indicated all measures were within 'normal limits' for kurtosis, index of less than 10, and skew, statistic less than 5 (see Curran, West, and Finch 1996). Stem and leaf and box plots indicated normality across the variables. A Mahalanobis distance was applied for assessing multivariate normality and three problematic observations were removed.

Results and discussion

Research objective one

The mean scores and standard deviations for graduate perceptions of their ability to apply oral communication skills in the workplace at both their time of graduation and post-graduation are presented in Table 3. T-tests indicate - as expected - graduates perceive they are better able to perform these skills after a period in the workplace, confirming the value of related work experience in skill application and performance. **[Insert Table 3]**

A repeated measures ANOVA was conducted for age, sex, industry sector, work area, and organisation type to test for differences in graduate ability to apply skills at the two different time points, based on their personal and work background characteristics. There were no significant results for the between-subject main effect (that of the defined characteristic on

skill application) or within-subject interaction effect (difference in skill application at and post-graduation attributed to the defined characteristic) with the exception of a significant main effect for work area, $\lambda=.941$, $F(24,2317.629)=1.712$, $p=.017$. There were significant univariate results for verbal communication, conducted at Bonferroni-adjusted α levels of .013, $F(6,667)=2.936$, $p=.008$, partial $\eta^2 =.026$. Post-hoc analysis revealed those in Finance were significantly less able to apply their skills than those from Administration/Legal areas ($p=.007$). The within-subject main effect (difference in skill application between the two time points) was significant throughout ($p=.000$), aligning with the t-test results.

Research objective two

Structural Equation Modelling (SEM) was used to assess the relative impact of learner, learning program and workplace characteristics on transfer. This technique was selected in order to capture the influence of hypothetical and unobserved latent constructs, namely workplace and learning program characteristics, on skill transfer. The proposed model requires the estimation of 59 parameters, the achieved sample ($n=674$) satisfying Bentler and Chou's (1987) recommendation of a minimum of ten cases per parameter. Before testing the graduate transfer model, a measurement model was created to assess convergent and discriminant validity among the latent variables of learning program, workplace and skill transfer and examined using Confirmatory Factor Analysis (CFA). Aligning with best practice (Kelloway 1996), a range of model fit indices were computed, in combination with assessing changes in chi-square results. Concerns for the combined use of CFA and SEM (Noe 2000) are acknowledged yet substantial theory supports the use of an *a priori* model. The sample size ($n=674$) exceeds Kline's (2005) recommended ratio of ten participants to every parameter.

Confirmatory Factor Analysis

Exploratory factor analysis confirmed the collection of examined learner characteristics did not emerge as a second-order factor. In regard to the TIPI scales for measuring personality, alpha coefficients for the five domains ranged from .405 upwards. Gosling et al. (2003) acknowledge that TIPI scales often produce “unusually low internal consistency estimates” (516) due to the small number of items and their efforts to retain content validity. The ten-item scale provides an example of the trade off between a scale’s length and internal consistency (Furnham 2008). As predicted, all variables relating to learner characteristics will load independently onto the skill transfer construct. These variables do not belong to a latent construct and were therefore not included in the measurement model.

Table 4 reports the means, standard deviations and inter-correlations among the observed variables. The high correlations, ranging from .427 to .685, among those items belonging to the same latent construct suggest convergent validity. Further evidence of convergent validity is the strong squared multiple correlations between items and their latent construct; ranging from .422 to .674, Further, all factor loadings exceed .650 and are significant ($p < .001$). Cronbach alpha coefficients of .878, .897 and .855 for program, workplace and transfer respectively indicate construct reliability. **[Insert Table 4]**

Discriminant validity is confirmed with low correlations, ranging from .072 to .338, among items belonging to different constructs. Correlations between the latent constructs ranged from .251 to .320, these low values supporting discriminant validity in the measurement model. Bagozzi, Yi and Phillips’ (1991) approach of constraining the correlation between each pair of latent constructs was implemented. For each pair, the model fit was significantly worsened ($p = .000$) using the chi-square difference test; concluding discriminant validity holds

and the constructs are different. Table 5 presents the goodness-of-fit indices for one-factor models and the overarching measurement model used to test the structural relationships in the proposed model. Fit indices were the comparative fit index (CFI), with a recommended threshold of .95 (Hu and Bentler 1999), the standardised root-mean-square residual (SRMR) and the root-mean-square error of approximation (RMSEA) – with recommended levels of .05 and .06 respectively (see Hooper, Coughlan, and Mullen 2008). The measurement model fits the data well and the fit indices indicate construct validity; the measurement model is measuring what it intended to. Table 6 provides the factor loadings within the measurement model, the standardised values ranging from .650 upwards. **[Insert Table 5]** **[Insert Table 6]**

Structural Equation Modelling

An initial structural model, including the five personality domains with direct causal relationships to skill transfer, was created and tested. ‘Agreeableness’ and ‘Emotional Stability’ had insignificant regression coefficients and produced a poorly fitting model so were removed from the analysis. Figure 2 presents the final structural model’s standardised loadings and path estimates. All are significant at $p < .001$ level, with the exception of workplace characteristics requiring a more relaxed α threshold ($p = .002$).

Different goodness-of-fit measures were used to assess the model. The model has a chi-square value of 373.115 ($\chi^2_{172} = 373.115$, $p = .000$) which suggests there is a significant statistical difference between the theory-based model and the original data. The danger of committing a Type I error, rejecting an acceptable model, is significant for chi-square tests with large samples and differences in the data may actually be unimportant (Gulliksen and Tukey 1958). The normed chi-square (χ^2/df) value of 2.169 falls considerably below the recommended

threshold of 5 (Wheaton et al. 1977) and the CFI value of .966, SRMR of .041 and RMSEA of .042 are all below recommended levels.

In conclusion, the model provides a good representation of the data. The estimate of squared multiple correlation (SME) for transfer is .326, meaning the predictors in the proposed model explain 32.6% of its variance. Assuming the model fits theory, a threshold of .3 is considered acceptable for maximum likelihood estimation (Winter and Lockwood 2005). SMEs for the independent factors range from .421 to .679 and represent a measure of their predictive power. Further, the standardised residuals do not exceed the recommended absolute value of four (Hair et al. 2010).

Learner characteristics. In regard to the relevant influence of the different factors on skill transfer, learner characteristics play a significant role. The three personality domains and the learner's related work experience are all important to skill transfer. 'Openness to experience' refers to intellect and is associated with being "imaginative, cultured, curious, original, broad-minded, intelligent and artistically sensitive" (Barrick and Mount 1991, 5). They suggest this domain identifies those who are "training ready" (19) while Herold et al. (2002) found openness enabled trainees to acquire skills faster.

'Extraversion' refers to high self-esteem, ambition, taking initiative and being sociable, gregarious and active (see Barrick and Mount 1991). They found extraversion and openness both significant predictors of training proficiency, equating to the strong propensity to learn also identified by Naquin and Holton (2002). Thoms, Moore and Scott (1996) found a significant correlation between extraversion and self-efficacy, the latter broadly acknowledged as a strong predictor of transfer (Chiaburu and Lindsay 2008). Interestingly,

Nicholson et al. (2005) found a clear pattern for risk propensity which combined high extraversion and openness with low levels of neuroticism, agreeableness, and conscientiousness.

Conscientiousness, described as “the most important trait-motivation variable in the work domain” (Barrick, Mount, and Strauss 1993, 721), is associated with being disciplined, persevering, achievement oriented and systematic (see Herold et al. 2002). There is some evidence to suggest conscientiousness impacts certain transfer outcomes (see Burke and Hutchins 2007) although the authors recommend the relationship between personality dimensions and transfer requires further research. The results also imply those graduates with more work experience since graduation had better transfer outcomes than those with less, aligning with Lim’s (2001) study of a Korean conglomerate which showed individuals with longer periods of work experience achieved higher levels of transfer. The absence of a control variable for prior Work-Integrated Learning, such as internships and placements, should be noted.

Learning program characteristics. All six learning program characteristics factors are important for transfer. Encouraging students to reflect on their performance and defining specific learning objectives for the targeted skills have the strongest loadings onto program characteristics and explain the largest amount of variance in this construct. Acquiring skills in a collaborative environment with small group learning and peer feedback follows closely behind. This aligns with higher education’s growing interest in active (see Burke and Hutchins 2007) and small group learning which incorporates peer feedback and reflection (see Micari et al. 2010) and substantiates transfer literature’s heavy focus on how students learn rather than what they learn. These all combine to build on students’ meta-cognitive skills,

considered vital for transfer (Bransford and Schwartz 1999). There is significant evidence to show that networking with peers and sharing ideas on curricula content impact considerably on transfer (see Burke and Hutchins 2008). Heaven et al. (2006) advocates students first review their own performance before receiving objective feedback to promote transfer.

Workplace characteristics. Short and long term goal setting and the identification of future training needs; feedback on performance and skill application; and access to role models, mentors, buddies and coaches to assist with skill application have the highest loadings onto the workplace construct. Avenues for peer collaboration are also important, suggesting those factors which directly impact on individual job design – rather than organisational climate - are critical to skill transfer (Kupritz 2002). This aligns with literature's profound focus on the broad influence of supervisory and peer support and the need to provide continuous feedback and guidance to learners.

Multi-group analysis. Multi-group analysis on a number of demographic/work background variables was conducted to check the robustness of the model across different groups of graduates. Factor loading invariance was first assessed then the interaction effect of organisation type; work area (finance or non-finance); work-integrated learning (WIL) completion as part of degree studies; time since graduation; time spent in current job role; and sex on skill transfer. There were no significant changes to the model for any of the specified variables. This underscores the robustness of the model and suggests a generic model of transfer despite diversity in individual's demographic and work background characteristics.

These findings counteract Holton et al.'s (2003) who found differences in the impact of certain variables on transfer for employees in profit and not-for-profit organisations.

Differences among industry sectors have also been detected (McDonnell, Gunnigle, and Lavelle 2010) yet were not examined here due to significant disparity in group sizes. The lack of variation among groups who graduated at different times and with different experience levels in their current role, confirm transfer is not simply a function of time (Heaven et al. 2006). Specific to the transfer of communication skills, findings have some alignment with Bandura's (1997) model which advocated self-efficacy, outcome expectancy, and workplace support all enhance transfer outcomes.

Research objective three

Interventions for enhancing graduate skill transfer can be teased out from the results. Practical strategies, rather than abstract principles such as those developed by Haskell (2001), are lacking (Holton and Baldwin 2003), particularly for graduates, although Burke and Hutchins (2008) provide an excellent summary of best practice for training transfer.

Graduate employers

The model implies a number of action points for graduate employers. First, given the estimated effects for feedback, goal setting and role models, is the importance of introducing mentoring and buddy schemes for new graduates. Although this is now common practice (AAGE 2011), it is important these schemes attend to the process of applying skills in the workplace. Employers must ensure graduates are able to negotiate meaningful learning goals with their mentors, role models or supervisors and that feedback is systematically incorporated into performance management processes. This should, however, go beyond a formal, summative process and extend to regular, informal feedback which addresses skill application and capitalises on degree program learning. The point of difference for employers

may be shifting their focus from performance management approaches which are outcomes-focused rather than process-oriented.

Employers should understand the longer the period of related work experience, the more able graduates are to apply their skills. This may have implications for graduate programs which are often structured into short (four to six months) rotations across a range of different contexts (AAGE 2011). Also important, denoted by the effect for collaborative work environment, is establishing avenues and networks for peer collaboration which enable discussion on the development and application of relevant skills (Austin et al. 2006; Heaven et al. 2006). This could mean forums and workshops, online collaboration – such as wikis, discussion boards and/or blogs - and resources for employability skill application in a virtual area dedicated to new recruits. Such initiatives are emergent yet appear to focus more on streamlining graduates into organisation culture than specifically addressing skill application issues and concerns. Nurturing knowledge creation and information sharing through flat organisational structures (Kontoghiorghes 2004) and performance management systems which encourage peer appraisal and reciprocal support (Chiaburu and Marinova 2005) would also prove valuable.

The absence of negative group norms and establishing a climate which nurtures change will facilitate the transfer of valuable skills acquired during degree programs. In alignment, and to harness the estimated effect for flexibility, sufficient time should be allowed for graduates to practising acquired skills, reflect on their performance and apply their skills in a more innovative way, before they progress to their next rotation. Encouraging, through formal policy and informal supervision, a job design with manageable workloads and facility for experimentation and autonomy in achieving work outcomes will enhance transfer (Awoniyi et

al. 2002). Rewards for innovation and enhancing the knowledge economy will not only encourage transfer but also improve organisational performance; performance management systems should therefore be based on effort, rather than simply results (Chiaburu and Marinova 2005).

For those in graduate recruitment, the estimated effects suggest better transfer outcomes for individuals with higher scores in ‘extraversion’, ‘openness to experience’ and ‘conscientiousness’. This supports incorporating personality measures into graduate recruitment and selection processes (Furnham, Chamorro-Premuzic, and McDougall 2003) or at least ensuring the assessment of key aspects of the three domains –intellect, confidence, ambition, innovativeness, sociability and discipline – is standard practice. Significant evidence these three domains are highly correlated with management readiness (Encalarde and Fok 2012) and effective leadership (Moscoso and Iglesias 2009) augments this further.

Educators

Personality’s significant influence on transfer urges its consideration in core undergraduate curricula. This could mean administering a series of personality measures at different stages of the degree program, each with associated reflection and debrief of findings and their implication on employment outcomes, skill application, and personal well-being. The importance of personality profiling in undergraduate education is acknowledged (Farsides and Woodfield 2003) yet practices in relation to employability skill development and transfer is unlikely to be widespread. Although nurturing key attributes of the three domains in undergraduates would be ideal, at least incorporating self-reflection on personality traits and their potential impact on workplace experience should become core curricula. Developing intellect remains the central objective of undergraduate education and commitment to

completing a degree would suggest a certain level of ambition. Sociability is important as industry networking skills impact on graduate employability (Bridgestock 2009). Self-management encompasses the ability to multi-task, work autonomously, achieve work-life balance, self-regulate emotions and tolerate stress; all vital to employability (see Jackson and Chapman 2012a). There is an abundance of literature clarifying which personal traits determine innovativeness in individuals (see Egan 2005), in addition to the importance of self-esteem on academic performance and employment outcomes (Bridgestock 2009). Some of these personality characteristics are indeed incorporated into national skills frameworks, such as Australia's (Department of Education, Science and Training 2002), and institutional graduate attribute frameworks although their focus on outcomes, rather than how to strategically acquire and apply skills, is a concern (Billing 2007; De La Harpe and David 2012).

Successfully nurturing these personal attributes, traits or characteristics requires meta-cognitive skills for reflecting upon strengths and weaknesses in ongoing performance (Dacre-Pool and Sewell 2007). Reflective activities and assessments, such as blogs and journals, are valuable ways of enhancing meta-cognition while motivating learners to pursue lifelong learning (Martin, Rees, and Edwards 2011); critical for transfer (Tennant 1999). Nurturing motivation to transfer and succeed is also vital as it fosters goal orientation and self-regulated learning (Billing 2007). Competitions, awards and liaison with industry through networking events are all methods of positively reinforcing differences in skill application between university and workplace contexts.

Results strongly assert the use of explicit learning objectives. Souto-Otero (2012) states "learning outcomes are presented as instruments to solve problems of transparency, quality,

accountability and efficiency – as they provide precision and avoid overlaps/repetition in learning” (250). While Werquin (2012) echoes the value of learning outcomes as a tool for transparency of content and a basis of communication between work and education, others express concern with difficulties in interpretation and fuelling inequalities in education systems (Allais 2012). Young (2011) discusses the benefits and challenges associated with adopting an outcomes model in qualification frameworks. Souto-Otero reiterates the importance of adopting a process-orientated approach to the use of learning outcomes; loose interpretation, broad conception, flexibility in use; and consideration of the institutional setting all vital to their design and implementation (Raffe 2009).

Findings also suggest incorporating active and collaborative learning into employability skill development is essential for transfer, as is teaching underlying theory for the targeted skill, explicitly imparting each skill’s relevance by relating them to career objectives, and developing learning contexts which emulate the workplace environment. Ettington and Camp (2002) provide some interesting strategies for establishing similarities between small groups operating in the learning and workplace contexts. Enhancing undergraduate understanding of the different types of work groups, and the one which they are specifically emulating, may help with skill acquisition and transfer. Authentic learning, and the use of ‘real’ workplace projects, is also increasingly acknowledged as highly beneficial to student learning (Meyers and Nulty 2009) and the use of mentoring and buddy schemes in undergraduate programs may also assist with skill acquisition (Bridgestock 2009) and subsequent transfer.

These strategies may be standard practice for developing core, disciplinary content but, despite substantial government resourcing and a wealth of research on graduate employability, skill development in higher education is haphazardly addressed. Attributing

factors typically relate to institutional resource deficiencies and barriers to change management (De La Harpe and David 2012). The heterogeneous and widely disparate approaches to skill development, within and across different universities, is problematic and although educators appreciate the importance of employability skills, their development remains outcomes-focused with little consideration of incorporating learning and assessment into core content in a meaningful way. There are some forerunners who have developed process-oriented, stand-alone programs (see Jackson, Riebe and Sibson 2013) and others who have systematically mapped skill development (Oliver 2011) across entire courses yet progress is slow.

Graduates

Making graduates aware of the concept and importance of skill transfer is the responsibility of higher education. Helping students understand and appreciate those factors which influence skill transfer is critical (Haskell 2001) and will assist their career progression, lifelong learning, and productivity. Learners must also take responsibility and nurture relevant aspects of their personality through education, work, and social experiences which enhance skill transfer.

Limitations of study

This study represents an important research effort of an area notoriously difficult to measure (see Blume et al. 2010) and, for the graduate context, lacking in empirical grounding. There are, however, a number of limitations to the study. First, it is sample specific and would therefore benefit from cross-validation with a different sample of graduates. The 674 individuals form only a small proportion of the total number of students who graduated between 2009 and 2012, highlighting the need for caution when generalising the results. The

sample is, however, not a single source and its diversity creates a rich data set. Examination of a broader set of employability skills, in addition to comparing with core disciplinary skills, and cross-disciplinary analysis, beyond the field of business, would add weight to the model. Third, it is important to acknowledge concerns for common method variance (Podsakoff et al. 2003) with data gathered from the same source, using the same method and at the same time. Self-report data may attract upward bias (see Fulmer and Frijters 2009), often due to high social desirability (Podsakoff et al. 2003). There is, however, no evidence that learners are unable to accurately report on skill transfer (Chiaburu and Marinova 2005) and no need for graduates to impress supervisors/managers in this particular study. Evidence of construct and divergent validity may counteract concerns with using the self-report data. Finally, the study concerns the perceptions of individuals rather than a 'hard' measure of transfer per se.

Unlike other studies (Baldwin and Ford 1988; Lim and Morris 2006), participants' transfer outcomes at pre-, immediately post- and other times following training, in this case the degree program, are not obtained. Although the benefits of this research framework are duly noted, it would be difficult to implement such a longitudinal 'tracking' study of a large number of graduates. Also, participants did not all graduate at the same time so there is not an absolute measure of 'time 1' and 'time 2', as achieved in some corporate training studies (see Lim and Morris 2006). The possibility of 'recall error', when participants rate their ability for both present and graduation time points, should be acknowledged. In terms of effect sizes for transfer outcomes, some argue self-report data will inflate ratings, a longer lag time will reduce ratings and measures of job performance produce lower ratings than those related to training content (see Farrington 2011). For this study, the interplay of these factors may counteract significant bias in one direction. Finally, the survey instrument was comparatively

simple with some single-item measures given the difficulties in recruiting business graduates for complex and time consuming studies.

Conclusion and future research

This study has explored and modelled far skill transfer in graduates, an important determinant of graduate employability (see Jackson 2013). It enriches our understanding of factors which influence the skill transfer process, as well affirming the critical role of stakeholders and the need for their collaboration in enhancing graduate transfer. Findings suggest certain personality traits – namely ‘Extraversion’, ‘Openness’ and ‘Conscientiousness’ - considerably impact on graduate ability to transfer, along with the individual’s related work experience and a range of characteristics corresponding to both undergraduate degree program (learning context) and work environment (application context). Influential learning program characteristics, in order of effect size, are the implementation of learning objectives; student reflection; collaborative learning environment; emphasis on the relevance of learning skills; teaching theory which underpins the skills; and developing similarities between the learning and workplace contexts. Although some of these may be well-versed in higher education, this may apply to developing technical expertise rather than employability skills.

Important workplace characteristics range in effect size, the most influential being access to role models, followed by performance feedback, goal setting, mentoring, peer collaboration and supervisory support; and working in a climate which supports change and encourages flexibility. Again, some features could already exist in graduate programs yet may focus on enhancing skill performance outcomes, rather than assisting graduates with the process of applying skills in different contexts. Stakeholders actively implementing intervention strategies, and continuously reviewing their impact and success as with any continuous

improvement cycle, are critical steps in enhancing graduate transfer and alleviating documented skill gaps. Ultimately, graduate employers will maximise their investment return on recruited graduates; aligning with Grossman and Salas' (2011) assertion that organisations implementing human resource practices to promote transfer typically outperform those who do not. Educators will better meet industry calls for high-performing and work-ready graduates and graduates will benefit from career progression and intangible rewards for successfully applying their skills and knowledge in the workplace.

The study also highlights some pathways for future research. A study which differentiates vertical transfer - where simple skills are mastered first then students naturally progress on to more complicated content –from lateral transfer, where students may be mastering a number of more complicated skills simultaneously (Gagné 1965), would provide valuable information on the sequencing and scaffolding of skill development to enhance transfer. Further, there is a general notion that high learning results in better transfer. Although few studies show a positive relationship between learning and transfer (Holton 1996), they have seldom examined the pattern of learning transfer according to the type of learning program content. Broadening exploration of the learner characteristics domain to investigate the potential influence of socio-economic background on the transfer and application of oral communication skills may ameliorate the model (see Kempe 2003), as could a more detailed investigation of the influence of work experience, and possibly social experience or 'life spheres' (Wheeler 2008) such as a gap year after graduation.

Future studies would benefit from using samples with a longitudinal dimension where individuals are observed at different points in time. Further, results could be triangulated with data gathered among managers and/or supervisors of the surveyed participants. Benefit would

also be gained from further investigation into the effects of age, organisation type, industry and gender and interaction effects between individual, program, and workplace characteristics, as well as gender. Gathering data on best practice in intervention strategies in both the workplace and higher education is also important (Major et al. 2007), particularly in times of economic flux and intense global competition. Although some contest the best-practice approach in HR, opting instead for a contingency model (Burke and Hutchins 2008), the generality of the transfer model augments recommended standard interventions for all organisation types. Constructing competing models of skill transfer, and comparing them for parsimony and fit using, for example, the Akaike Information Criterion (Schermelleh-Engel, Moosbrugger and Müller (2003) would enrich the modelling process further. SEM does not investigate causality (see Hair et al. 2010) thus future study could further test the proposed model, and alternatives, through randomised control which compares graduates receiving the proposed intervention strategies and those which are not. This would inform policy recommendations for enhancing transfer in graduates and, ultimately, their employability.

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Table 1 Sample demographic and work background characteristics

Variable	Subgroup	Respondents	
		n	%
Age Group	19-21 years	70	10.4
	22-24 years	370	54.9
	25-27 years	137	20.3
	28-30 years	31	4.6
	31-40 years	66	9.8
Sex	Female	370	54.9
	Male	304	45.1
Time in current job	Less than 12 months	413	61.3
	13 to 24 months	170	25.2
	25 to 36 months	91	13.5
Total time working since graduation	Less than 12 months	382	56.7
	13 to 24 months	199	29.5
	25 to 36 months	93	13.8
Time since graduation	Less than 12 months	161	23.9
	13 to 24 months	274	40.7
	More than 25 months	239	35.4
Organisation type	Private	306	45.4
	Public	349	51.8
	Not-for-profit	19	2.8
Industry sector	Primary (i.e. Mining/Agriculture)	65	9.7
	Secondary (i.e. Manufacturing)	34	5.0
	Tertiary (i.e. Business Services/Retail)	575	85.3
Work area	Finance	278	41.2
	HR	46	6.8
	Policy/research/regulation	61	9.1
	Marketing/sales/advertising	54	8.0
	Management	119	17.7
	Administrative/legal	87	12.9
	Other	29	4.3

Table 2 Model measures in survey instrument

Factor	Sub-factors	Item/sample item	Alpha	
			Grad	Post-grad
<i>Transfer</i>				
Verbal communication	Language and expression Purpose and audience	Can vary language and expression to suit a broad range of audiences and situations.	.844	.733
Feedback	Quality Respect	Habitually provides clear, appropriate and constructive feedback to others	.652	.672
Public speaking	Language and expression Purpose and audience Central message Structure Delivery techniques Supporting materials	Uses a broad range of supporting materials that establish credibility/authority on the topic	.938	.920
Meeting participation	Listening Contribution Adding value Attendance	Demonstrates strong listening skills; does not interrupt others and ensures that all participants get the chance to contribute to discussions.	.788	.785
<i>Learning program characteristics</i>				
Context similarity	Efforts were made to make the university classroom similar to the workplace environment. For example, using real-life projects and case studies for assessments and learning activities.			
Theory	I was taught the theory behind the communication skills. For example, how to give good presentations and how to give and receive feedback.			
Skill relevance	I felt these communication skills were relevant and important when I was learning them university.			
Learning objectives	I was given specific and explicit learning goals for these communication skills.			
Collaborative learning	I acquired these skills in a collaborative environment, i.e. in small group learning scenarios with peer feedback.			
Reflection	I was encouraged to reflect on my performance in these skills and the strategies I could adopt to improve in them.			
<i>Workplace characteristics</i>				
Change climate	I would rate my organisation's overall climate/attitude for adopting change as high.			
Negative group norms	There are no negative group norms present which prevent me from applying my communication skills in the workplace. For example, no-one is reluctant to try new methods of giving/receiving feedback or ways of presenting information to senior managers.			
Collaboration	There are avenues where I can collaborate with peers (such as communities of practice) on the development and application of communication skills.			
Goal setting	Establishing short and long term learning objectives and identifying future training needs is strongly encouraged in my organisation.			
Feedback	There are feedback mechanisms in place for managing my work, including the application of communication skills.			
Role model	I have adequate access to role models, mentors, buddies and coaches to assist with my application of communication skills in the workplace.			
Flexibility	My workplace provides the flexibility and opportunity to practice the communication skills I acquired at university.			

Table 3 Skill application mean scores and *t*-test results

Behaviour	Graduation		Post-graduation (<i>< 3 years</i>)		Mean Difference	Standard Error	<i>P</i> -value
	Mean	<i>SD</i>	Mean	<i>SD</i>			
Verbal communication	4.808	1.12	5.660	.76	.852	.046	.000
Feedback	5.002	1.04	5.696	.74	.694	.043	.000
Public speaking	4.751	1.10	5.457	.76	.707	.043	.000
Meeting participation	5.064	1.03	5.706	.73	.642	.042	.000

Table 4 Mean, standard deviations and inter-correlations among factors

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Meeting	5.706	.732	1																
2. Public speaking	5.457	.762	0.653	1															
3. Feedback	5.696	.741	0.640	0.583	1														
4. Verbal comm.	5.660	.759	0.556	0.629	0.519	1													
5. Workplace flexibility	5.134	1.355	0.270	0.267	0.242	0.213	1												
6. Reflection	3.941	1.605	0.198	0.263	0.178	0.118	0.288	1											
7. Role model	5.473	1.531	0.137	0.101	0.129	0.110	0.513	0.113	1										
8. Feedback	5.323	1.445	0.191	0.192	0.182	0.164	0.522	0.185	0.685	1									
9. Goal setting	5.426	1.482	0.133	0.072	0.108	0.091	0.449	0.151	0.666	0.635	1								
10. Collaborative environ.	4.976	1.474	0.182	0.230	0.194	0.181	0.542	0.217	0.598	0.597	0.616	1							
11. Negative norms	4.938	1.478	0.123	0.098	0.144	0.109	0.498	0.200	0.571	0.515	0.534	0.537	1						
12. Collaborative learn.	4.565	1.541	0.175	0.248	0.156	0.124	0.288	0.575	0.138	0.179	0.183	0.202	0.192	1					
13. Change climate	4.996	1.607	0.117	0.094	0.128	0.085	0.427	0.203	0.571	0.535	0.591	0.537	0.530	0.236	1				
14. Theory	4.316	1.676	0.195	0.248	0.161	0.174	0.210	0.535	0.124	0.165	0.144	0.169	0.144	0.479	0.170	1			
15. Skill relevance	4.586	1.547	0.163	0.221	0.180	0.101	0.338	0.564	0.156	0.174	0.190	0.204	0.166	0.581	0.217	0.491	1		
16. Learning objectives	3.856	1.607	0.208	0.240	0.177	0.143	0.271	0.685	0.100	0.147	0.154	0.189	0.175	0.615	0.214	0.545	0.561	1	
17. Context similarity	3.878	1.591	0.141	0.205	0.148	0.102	0.241	0.533	0.128	0.172	0.137	0.157	0.158	0.503	0.206	0.529	0.483	0.511	1

Table 5 Goodness of fit for different factor models

Model	χ^2	df	χ^2/df	CFI	RMSEA	SRMR
Transfer	55.897***	14	3.993	.983	.067	.025
Program	19.3***	2	9.647	.985	.113	.022
Workplace	37.6***	9	4.175	.984	.069	.024
Measurement model	291.756***	116	2.515	.969	.047	.046

***significant at the $p < .001$ level (2 tailed)

Table 6 Factor loadings in measurement model

Factor	Unstandardised regression weights (SE)	Standardised Regression weights
<i>Program</i>		
Context similarity	1.068***(.057)	.671
Underlying theory	1.069*** (.068)	.682
Skill relevance	1.113*** (.054)	.720
Learning objectives	1.302*** (.053)	.811
Collaborative learning	1.151*** (.053)	.747
Reflection	1.286*** (.053)	.802
<i>Workplace</i>		
Change climate	1.137*** (.056)	.708
Negative group norms	.904*** (.053)	.696
Collaborative environment	1.126*** (.050)	.757
Goal setting	1.174*** (.049)	.792
Feedback	1.147*** (.048)	.794
Role models	1.252*** (.050)	.818
Flexibility	.880*** (.048)	.650
<i>Skill transfer</i>		
Verbal communication	.545*** (.027)	.718
Feedback	.550*** (.026)	.743
Public speaking	.625*** (.026)	.821
Meeting participation	.591*** (.025)	.808

***significant at the $p < .001$ level