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Articles
Higher Education: A Case for Professional Development for Employability


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ABSTRACT

Education, its delivery, pedagogic practices and future are intimately associated with the evolution of education and professional practice. This paper discusses a number of current educational, pedagogic and professional development issues all considered relevant to the future of engineering education and practice and offers potential ways forward to addressing these key issues. The paper also examines factors, which could affect how engineering might look over the next decade and considers how these indicators might shape the overall future of higher education, and in particular engineering education. It is concluded that while future educators will still require to be academic discipline based they will also have to develop a much more in-depth understanding of the key factors that shape the employability of their students.

Keywords: Professional Engineer, Professional Practice, Student Employability

INTRODUCTION

Engineer, like Lawyer, like Doctor, like Teacher are terms that cover many domains of knowledge and styles of professional practice. The preparation of ‘would be’ members of these professions follows routes that have not changed greatly in the last 20 years, in that each is required to follow a university programme leading to a qualification, accepted by the profession’s governing body. Recently the concept of what it means to be a professional and what shapes professional practice has come under intense scrutiny. Eraut [1] suggests that models of professionalism follow a functionalist model as developed by Goode, Merton and Parsons [2, 3, 4] where professional knowledge is the most important element of professionalism. A key element of professions is their autonomy and freedom from external interference in professional matters, a position supported by the exclusivity of access to the knowledge base. It is typical of this model that the preparation of the aspiring professionals is vested in a higher education programme that may involve purely taught elements or a programme that is part taught and part periods of pupillage. Typical modes of induction into the knowledge base are:

- A period of pupillage or internship, during which students spend time learning their ‘craft’
- Enrolment in a professional college outwith the higher education system
- Qualifying examinations usually set by a professional association
- A period of study at a college or university leading to a recognised academic qualification
- A collection of evidence of practical competence in the form of a portfolio or logbook
- Part academic study and part practice

Teachers and nurses are two examples of professionals who do have a period of practical training included in their preparation for professional practice. Generally it is not compulsory for engineers to undertake this professional practice as part of an undergraduate preparation, although many develop professional expertise in practice. Governments have in recent years recognised that knowledge economies require educated workforces to sustain them and the global market place requires communication technology in order to participate effectively. To facilitate economic participation and an economy that is competitive, economic policy and education have become inextricable linked. OECD and others, discussing emerging educational challenges, identify “linking the world of learning and the world of work” and “Adult learning: adaptation of the labour force to the needs of the knowledge economy and to demographic situation (e.g. ageing population); financing and incentives issues; national qualifications system; co-operation between stakeholders; use of ICT; connectedness with other socio-economic policies; international assessment of adult competencies” as issues. [5, 6, 7] Organisations that operate within these environments have recognised two fundamental requirements, namely the workforce has to be educated and it must use knowledge for competitive advantage. A consequence of this has been a changing profile of employability, with specific discipline skills requiring to be supplemented with life skills and thus, employability being dependant on more than the discipline knowledge base. Following this stance two potential dilemmas face engineering and engineering education. Firstly what form will engineering education take in the future; what will be the learning environments, the pedagogies adopted and the technology used to achieve this skills profile. Secondly, assuming that
currently observable trends in labour market demands are sustained and in all probability strengthened, how will
the preparation of the engineers of the future retain professionalism?

Concepts of Professional Development

It is stated above that a defining feature of professionals is their access to and application of a knowledge base that is shared by others in the profession. Achieving this knowledge base usually involves an initial education that leads to a qualification approved by the appropriate professional organisation. In engineering this involves following a programme of study that leads to an accredited engineering degree. Typically this training involves developing and consolidating the required knowledge base. The skills acquired during this phase of training are mainly associated with understanding and application of knowledge referred to as model [8] with only minimal exposure to client/professional interaction. The development of professional skills by novice professionals after graduation is thought to continue for a number of years [1]. In respect of this the last two decades have seen an increased awareness of 'on the job' training referred to as continuous professional education (CPE) involving courses or educational events. Continuous Professional Development includes CPE and work based learning. The provision of professional development opportunities is manifold but it might be prudent to question at what stage of professional development these are provided and what the objectives are. Professional development may be seen as enhancing the specialist knowledge of participants or may be aimed at developing a wider range of skills. Appropriateness to the stage of professional development is often either overlooked or only superficially considered.

A modern interpretation of professional practice amongst other issues involves encouraging the professional to consider and reflect on their own practice. By reflecting, practitioners are reviewing actions and decisions and reaching informed judgements of their own practice, with the objective of learning how to improve. In the teaching profession it is now common to encourage trainee and practicing teachers to reflect on their practice to distil lessons about their attitudes, methods and pedagogy. The basic argument for this rests on work of Schon [9, 10] who has published works that underpin much of the concepts of reflective practice in relation to professionalism.

In recent years it has become obvious that the nature of higher educational policy and the labour market has been markedly affected by globalisation and the knowledge economy. We believe that the impact of these forces has resulted in education policy being used to support the need for a better educated workforce through increased participation in higher education. In effect this means that education has been encouraged through policy to gradually change to reflect the knowledge demands of the labour market.

The Engineering Profession - Special Aspects

The engineering profession in the UK is largely governed by the professional institutions; they set the academic requirements (the knowledge base and assessment of proficiency) that accredited courses must meet. In common with other professions, the professional organisations establish standards of practice, control admission to the senior grades of membership and generally police professional activity.

Engineering has undergone many changes in recent years starting with the Finniston Report [15] that sought to address criticisms that the graduates were not trained for participation in the business of engineering. Later developments have increasingly emphasised preparing graduates for the world of work through consideration of factors relating to employability [11, 12, 13, 14].

As a consequence engineering courses which are by nature vocational have been revised to include work related learning. One of the most significant changes took place at postgraduate level with the introduction of doctoral courses that combined industrial practice with advanced study, identified as Engineering Doctorates (Eng.D). [16, 17]

Higher Education Institutions (HEIs), as traditional learning environments, have provided a process for imparting the knowledge base of the profession. There is now an increasing school of thought that believes that the engineering curriculum is overloaded with technically explicit knowledge leaving little room for innovation and other important subject areas relevant to the formation of a professional engineer. The nature of learning environments and the learning they support has been discussed by a number of authors who generally recognise that HEIs support Giddons Mode 1 style learning with the workplace considered to encourage Mode 2. The workplace is now recognised as a learning environment and in the last 10 years specialist programmes have developed that seek to recognise the learning and support the accreditation of it for the award of a qualification. The awards available range from part of undergraduate qualifications, through to postgraduate certificates, diplomas and masters to doctorates.

The changing expectations of industry and the potential employability of graduates has modified the objectives of engineering undergraduate programmes from that of preparing the professional knowledge base to providing the student with some skills that are outwith such a knowledge base [18, 19]. Examples of these skills include report writing, presentation skills, team working and transferable life skills [18, 19]. Modification of curricula to include this skills profile has resulted in...
graduates who have some of the skills sought by the labour market. The recognition of these different kinds of knowledge is not as readily accepted by the professional institutions, which still control the basic requirement for the knowledge base – the distinctive feature of a profession. It is this gradual inclusion of skills that are not traditionally engineering skills that should encourage engineering educators to consider their pedagogic approaches. For example the development of the skill of reflective practice and other such life skills require a different approach and a different mindset from that required to deliver technical skills such as fluid mechanics. Thus educators need to consider what teaching practices are appropriate to the teaching of both sets of skills.

Higher Education Processes

The integration of academia and the workplace through work place learning programmes has amended some academic practices and led to some changes in pedagogy. Traditional pedagogic approaches, which involve lectures, tutorials and laboratories have a history or tradition which is generally well understood by most academics. The process delivers explicit discipline knowledge in a rhetorical form in which the student is the passive recipient and has to assimilate the facts and how they are used to solve problems associated with the discipline. In short the professional knowledge base is delivered and the student demonstrates proficiency in facts and processes associated with the practice of the knowledge. A student in this scenario is competent in mechanics. Thus educators need to consider what teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected teaching practice such that institutions can meet expected performance targets and student progression. This raises the following interesting point; are we dealing with being professional and employable or employable and professional?

High Education - Future Expectations

The evidence that undergraduate programmes are changing is sparse yet some HEIs in the UK are introducing problem-based learning into undergraduate engineering programmes changing the pedagogic model towards a more mode2 type of learning with the associated changes in the practice of teaching. It is not clear if this signals a change in the role of the engineering educator or simply involves the repackaging of the materials. Undoubtedly there does have to be changes to the nature of the teaching process, which is driven by the nature of problem-based learning but other issues, such as the role of reflective practice in professional development are emerging as necessary parts of curriculum models in the preparation of the novice professional, including engineers. How many of those teaching engineering at the present time are aware of the importance of this to the teaching method they adopt?

This was usefully described by Hills and Telford [20] “the professor is no longer the sage on the stage but rather the guide by the side”. It is now generally accepted that the expectation or output of the education process is being driven more and more by employers and government policy affecting the evolving demands of these agencies inevitably the process associated with teaching practice such that institutions can meet expected performance targets and student progression. This raises the following interesting point; are we dealing with being professional and employable or employable and professional?
his book Knowledge Capitalism. In roughly the same periods national economies underwent a succession of changes which saw the Taylorist – Fordest model replaced by systems that recognised a change in the market place requiring more responsive manufacturing to reflect developing consumer sophistication so product life cycles became shorter, just in time practices were introduced to manage inventory and automation created manufacturing that was less reliant on great numbers of people but more reliant on skilled people.

In parallel with these developments governments were increasingly aware of the need to have highly skilled workforces who could use modern technology to sustain economic performance and growth. Thus policy in the fields of economy and education became intimately linked, in that economic success was perceived as being sustainable only if there was a skilled workforce, and education was the vehicle that was charged with the task. The drive to ensure skilled workforces is especially strong where the intention is to focus economic activity in the business and industrial sectors, which delivers the highest added value. In these circumstances both the external markets and the organisations recognise that the real value of the knowledge in relation to competitive advantage is directly associated with knowledge generated and developed in the workplace which is then used in the workplace by the employees to achieve enhanced performance and economic efficiency.

Organisations have had to adapt to new demands in performance as the Internet and global communication technologies have effectively removed time and geographical barriers from the market place. Recruitment by organisations has taken on a focus driven not by what someone knows but by what use they can make of knowledge, how they react to knowledge gaps, how they understand the nature of using knowledge within the organisation and how it can sustain the competitive advantage of the organisation. Employability is not solely determined by having or not having a degree qualification as other factors suggested above are also highly significant.

Globalisation and knowledge based economy models have had economic and educational impacts but perhaps of more significance for the longer term is that the demands of the labour market (employing organisations) and government policy is increasingly exercising its influence on education. The early indications may be seen in the Finniston report [11] and more recently in the Lambert Report [6] and various other government publications that link economic performance and education. Education is seen as the vehicle that will ensure that the workforce is knowledgeable and employable. In the UK employability is seen as a key issue which influences much of the school curriculum agenda, further and higher education curricula and policies relating to continuous professional development. However, employability as a term is not well defined and needs further study by employers, government and educators alike to lead to a constructive and useful policy to assure the future relevance of engineering education.

The purpose of education has been debated from the time of the Greek philosophers. The Greeks separated the intellectual from the practical and this tradition has continued into modern times. More recently it has become evident that education and more specifically a major stated aim of education policy is the production of a skilled workforce for whom the skills are defined by economic policy and labour market needs. Where does this place professions, when one of the defining characteristics is the professional knowledge base? Assuming that the professional knowledge base is no longer the main criterion for employment what additional skills are required and how equipped to deliver these are engineering educators?

One possible scenario is the development of programmes that are geared to perceived economic determinants with curricular options that change, as needs change, along with updating (lifelong learning) opportunities to maintain the knowledge workers skills. In parallel the academic options are retained much as they are currently. In some respects this could be likened to the changes that overtook manufacturing engineering in the 70s and 80s, i.e. just in time approaches to education for economic needs. It might also be likened to the situation that existed prior to 1992 in the UK where polytechnics concentrated on preparing graduates for industry. It would indeed be ironic if the so called binary divide of pre 1992 which was abolished partly to facilitate enhanced higher education opportunities returned because the economy needed more practitioner oriented engineers.

DISCUSSION

Previously we suggested that the role of the educator was changing and that this implied the need to consider how these changes affected the educator. In addition to these considerations we are now suggesting that education has increasingly but not exclusively become a dynamic function of government policy which is closely allied to economic policy and consequently to essential labour market needs. The description of professionalism given at the beginning of the paper identified the knowledge base as a key distinguishing attribute, which led to novice practitioners who develop their profile of professional skills over a number of years after graduation. It was also noted that the knowledge base was essentially under control of professional organisations involved. We also suggested that pedagogic changes were occurring as a response to
employing organisations’ profiles for employability. These observations are hardly original yet they suggest a deeper change, which we outline in the paper.

We have shown that the growth of knowledge driven thinking in organisations to be closely correlated to economic success and the establishment of competitive advantage. Overall it fulfils and supports the economic vision for the future where education is seen increasingly as essential to the delivery of a highly skilled workforce that can deliver competitive and economic advantage within an organisation. The workforce to be delivered, however, is not defined by education but by the needs and requirements of the labour market, which arise through the demands of the employing organisations. These demands of the labour market though are not simply driven on the premise that to be effective it is essential to demonstrate efficiency in a specific discipline subject base. In most instances it is more about the ability to draw on multiple and interactive knowledge bases. The latter is potentially more important with regard to the competitive advantage of the organisation.

The notion of professionalism within the context outlined is most likely not the current model so how should engineering professionals view this fundamental change to the nature of their professionalism and the teaching of engineering? The options involve recognising that education/learning takes place in many environments using many different approaches. It will be necessary to understand how these skills and learning contribute to a profile that generically reflects skills for employability but which might not encompass the current, rather large, knowledge base that is seen as necessary for training professional engineers. The educator’s role will change requiring less specialisation in specific engineering disciplines but more skills in facilitation, mentoring and life coaching. The model should also have less formal engineering discipline based problem solving with much greater emphasis being placed on scenario based exercises involving a number of other disciplines.

The nature of professionalism may require to be redefined so that the knowledge base is more about skills and use of skills and less about factual knowledge which can be absorbed on a ‘just in time basis’ and this may well apply to engineering educators. In summary the engineering educator of the future will need to recognise the changing needs of students albeit driven by the labour market. The skills students need to acquire will involve different mindsets and therefore a different skills profile for the educators. The medium of delivery is changing towards more self-directed learning using distance education over the web – a different pedagogic approach.

Thus we suggest that in the case of engineering educators that the future will not necessarily be based on engineers with specific discipline based knowledge but rather they will have to have a much deeper understanding of the forces that shape the employability of their students, the resources available to them as educators, the wider knowledge skills that they must seek to impart and what they are the seeking to achieve. In conclusion we ask you to give some in depth consideration to the point we raised earlier in the paper;

**professional and employable or employable and professional?**

**REFERENCES**

George Burns has a first degree and PhD in Physics both gained at Strathclyde University. While studying for his PhD he gained teaching qualification and since graduation he has taught in secondary school, Further Education Colleges, The Scottish School of Non-Destructive Testing, Glasgow Caledonian University and is currently Senior Lecturer in the Department of Educational Studies in the Faculty of Education at the University of Glasgow.

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He is currently researching for a PhD in the area of knowledge management through the management of tacit and explicit knowledge within organizations.
How Effectively Do Vocational Junior College Food and Beverage Students Assess Themselves in Server’s Competencies in Taiwan

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ABSTRACT

Hospitality education applies a new “sandwich internships system” for students to integrate their theory and practice. This study surveyed vocational junior students to assess themselves for the server’s competencies. Group testing was performed by the questionnaire to two colleges which took a new sandwich system, with 308 effective samples in total. Results presented there were four dimensions with twenty-six items for server’s competencies. Students performed well in all domains, especially in the attitude domain. Male students performed better than female students in the dimensions of restaurant operating knowledge and personal attitude. Students who had taken internship performed significantly better than the students had not gone to the internship in three domains—food serving skills, restaurant operating knowledge, and the sense of side work.

Keywords: College Food and Beverage Students, Server’s Task, Server’s Competencies, Internships

INTRODUCTION

Due to the expected emergence of the service era in the future, hospitality education is getting popular in the education market in this decade in Taiwan, though it has been introduced as tourism education in the early time. It creates a new vision for schools to cooperate the hospitality industry with the sandwich system in an internship program. (Tsaur, Yung, & Liu, 2000) Hsiao & Chen (2004) studied the vocational education system in Taiwan and found that unsuitable vocational curriculum for students is one of the problems that needed to be solved. That study found that the need to offer professional practices and training to students is becoming more and more important for universities of technology.

According to Chung’s study (2000), there was a significant relationship between the hotel management curriculum and employee’s competencies. He also found that an undesigned internship program will make students underestimate the importance of internship. However, internship seems to be a suitable program for students to understand and to learn more about the industry. Internship provides good sources and opportunities for students to get job experience (Goodman & Sprague, 1991).

However, vocational skill is one of the aims of tourism education (Airey & Johnson, 1999). Few competencies-based hospitality curriculums have been studied in Taiwan recently. Most of the studies highlighted the discussion the ability in managerial work, with a lack of stress on the basic competencies. Most of the researches (Hsu & Gregory, 1995; Downey & DeVeau, 1998; Brophy & Kiely, 2002) discussed the management work more than the entry-level competencies for the restaurant or hospitality industry. In point of fact, before being a restaurant manager, a server’s competencies are essential. Therefore, understanding a server’s competencies for college students is necessary to address first.

According to the announcement from the National Ministry of Education, there are three objectives for educating students studying in the food & beverage management department in vocational high school. These objectives are to deliver the knowledge and skills of food & beverage production and service, to develop food & beverage management competencies in production and service, and to inculcate the working attitudes of honesty, industriousness, and enthusiasm in the students. But studies found the service competencies seemed not that important nor that qualified for vocational high school students. The students were expected to work in the kitchen better than in the dining room following graduation. Therefore, most of the competencies should be improved in the food & beverage production and service for high school students. Also, college and university students should be improved in their competencies in food & beverage management, too. (Chen, 1997; Lin, 2004; Lu, 2003)

Unfortunately, most of the studies (Downey & DeVeau, 1998; Ballinger & Lalwani, 2000; Tsaur, Yung, & Liu, 2000; Chen & Ho, 2001) focused on the policy, the system, and the model of the internship. Fewer studies discussed the effects of the specified competencies. Internship seems to be an ideal system to train students in some way for hospitality education. However, does it really improve student’s competencies as a restaurant server?
Server’s Task

Many books have described the tasks and duties for a server or a waiter, but few studies list the competencies clearly. Competencies could be analyzed in many ways; however, tasks analysis is one of the most recommended methods that it lists competencies items with industry orientation (Tien, 2001).

For restaurant operation, a server’s job is giving guest good service, being efficient, avoiding waste, attending to safety and sanitation, and following the rules and regulations set up by the management in a team approach. In addition, a qualified waiter or waitress must be reliable, cooperative, personable, healthy, clean and neat, knowledgeable, persuasive, and attentive (Dahmer & Kahl, 1996, p.2~3, 6). This was a hand draft for describing the characteristics of a good server.

Lillicrap & Cousins (1996, p.17–21) pointed out fourteen attributes and obligations for a service staff to attain certain standards. These were personal hygiene, knowledge of food and drink, punctuality, local knowledge, personality, attitude to guests, memory, honesty, conduct, punctuality, appearance, selling ability, sense of urgency, customer satisfaction, menu knowledge, and complaints. They listed forty-nine tasks within six categories, preparation for service, taking orders, service of food and beverage, billing, clearing, and clearing following service for a server.

Besides, fifty ready-to-use on-the-job training outlines in three areas for restaurant employees were listed, too. Two areas, sanitation and safety, and service skills are designed for front-of-the-house personnel. Sixteen items are a must for a server. They are personal hygiene, hand washing, back safety, handling hazardous chemicals quality service, dining room stations & sidework, how to set tables, how to load and lift a food tray, how to serve and clear, eight steps for American service style, learning the menu, serving safe food, suggestive selling, how to listen to a guest, how to handle complaints, and service of alcohol responsibility (Drumond, 1993, p.31~33). Particularly, the sidework for station preparation was emphasized except guest service. [Editor: I don’t understand the meaning of the previous sentence. Do you mean that sidework for station preparation was considered to be very important but guest service was not?] All these duties and tasks help to develop the task-oriented server’s competencies. According to this tasks list, server’s work was divided to three parts, preparation work before the guest arrived, service skills for the guests during dining, and the clearing work after guests have finished dining. Besides, personal characteristics and attitude, communication ability, and knowledge and laws for the restaurant operating should be included to complete a server’s work successfully.

Server’s Competencies

Competence is defined as one who can effectively perform his/her duties or tasks with a proper role in that profession, and the related activities are observable. It includes three domains of one’s abilities in cognitive, affective, and psychomotor domains (Tien, 2001). It is also distinct as the quality of being adequately or well qualified physically, and intellectually. According to the server’s tasks listed above, a server would perform his or her job well not only with a mastery of the skills and knowledge required in food and beverage service, but also with his or her own personal attitude and personality.

The basic food service competencies and special food service competencies by the tasks contents from work station were individually developed for designing a food service curriculum by Alaska State Department of Education in 1986. There are five tasks and competencies; providing meal, guest service, preparation of serving area, beverage, billing and clearing and maintaining the dining area (Alaska State Department of Education in 1986). This served as a helpful blueprint and guide for related studies afterwards.

Otherwise, Horng, Tsai, & Wang, (1999) used an interview, DACUM and questionnaire survey methods to investigate the server’s competencies for the international tourist hotels in Taiwan. They found there were fifteen cognitions, four affective, and one skill totalling twenty competency items for a server to possess. The items are language ability, communication ability, sense of crisis handling, appearance, cutlery use, sense of fire drills, food sanitation, understanding of restaurant operating, acquainted with hotel facilities, understanding the path for career promotion, sense of environment protection, table manner, cost controlling, food knowledge, working spirit, self-enriched, service attitude, healthy, and service skills. These competencies are the basis of the current study.

Internships

Internship is one of several types of employer-link activities. It has long been recognized as a compulsory element in professional degree courses (Ballinger & Lalwani, 2000). It is applied to the education as early in UK in 1880 (Tsaur, Yung, & Liu, 2000). Hospitality education applied the cooperative system industry termed the “sandwich program” in Taiwan in 1995. This is really a new milestone for hospitality education in Taiwan.

According to the study of Tsaur, Yung, & Liu (2000), the faculties responded that the quality and quantity of the facilities are important but are not sufficient in hospitality colleges in Taiwan. As physical assets are important aspect of service delivery (Barrows, 1993), and the space and market is limited at school, internship should play an important role for food and beverage
students to get acquainted with the service industry and the server’s competencies.

THE PURPOSES OF THIS STUDY

The purpose of this study was to explore how professional practice would be completed by the internship as a credited program for college students majoring in food and beverage management. Ladkin (2000) studied the use of vocational education and food and beverage experience for a hotel manager’s career development, suggesting a future study accumulating the skills and competencies for a manager would be important. According to the above research, an examination of a student’s entry-level skills for food and beverage industry should be the basic requirement. A server’s competencies in food and beverage students is one of the basic concepts.

The purposes of the current study were:

1. To explore the items and category for server’s competencies.
2. To examine the server’s competencies for vocational junior college students who majored in food and beverage management.
3. To compare the proficiency of server’s competencies for different characteristics of students in school system, gender, and internship’s participation.

METHODOLOGY

Study Design

This study used a questionnaire redesigned from the results of Horng, Tsai, and Wang (1999) with the opinions of five teachers teaching food and beverage related courses in colleges. Students were asked to rate their perceptions of their level of performance on each individual server’s competencies on a five-point Likert’s scale (1 = extremely not good, 2 = not good, 3 = neutral, 4 = good, 5 = very good). Subjects were all invited by group testing.

Subject

Subject were the vocational junior college students studying in the food and beverage department with the new “sandwich course program”, which meant students would take the internship for six months instead of the old one of ten months over two semesters. Only two colleges utilize this new system; therefore, students were all selected from these two colleges but the ones who were taking internship were 345 in total. A total of 315 questionnaires were returned and 308 were usable for an overall response rate of 89.28%.

Instruments

The questionnaire for surveying server’s competencies for food and beverage students in colleges contained demographic information and 26 server’s competency items. This questionnaire was redesigned from the results of Horng, Tsai, and Wang’s (1999) studies. Using interviews, DACUM and questionnaires with 4 points of Likert’s scale, they surveyed the vocational high school and college teachers who are teaching hospitality, workers in the international tourism hotel, and the experts. The research found there are twenty competencies for waiters working at the international tourist hotel in Taiwan.

The current study redesigned the competencies from twenty competencies to twenty-six competencies. The test of content validity was performed with the opinions from five college teachers who teach course in restaurant management, food and beverage operation, or service skills. These experts ensured all competencies except the service skill items. This service skill items were divided into seven competency domains: mise-en-place (preparation), receptive work, order taking, serving skill, complaint handling, billing, and clearing. There were twenty-six items for the questionnaire in total. A pilot test was performed with fifty night shift students studying the same courses. The Cronbach’s alpha was 0.881, which indicated the results of reliability testing were high.

Statistics

Data were processed by SPSS 10.0 statistics software. Descriptive analysis was used to analyze the characteristics of the sample and the extent of students’ own ability on their individual server’s competencies. Factor analysis was used to explore the dimensions of the server’s competencies. t-test was applied to test the identified hypotheses.

Limitations

The study was limited by the following factors:

1. The survey was limited to vocational junior college F&B students with the new “sandwich course program”. Students who study with the old course program were not included.
2. The competencies item were translated from Chinese to English from the Horng, Tsai, & Wang’s study, subtleties in the language may not have been translated precisely.
3. The participants were asked to assess themselves. The bias stemming from their own beliefs is impossible to prevent.
FINDINGS AND DISCUSSIONS

The Characteristics of College F&B Students in the New Sandwich Program

Of the 308 respondents, almost two-third (191) were female; 156 were private college students and 152 were public college students; more than half of the respondents (175) had completed internship and 133 were yet to complete it. (Table 1)

Table 1. Demographic information for the samples

<table>
<thead>
<tr>
<th>Variables</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>152</td>
<td>49.4%</td>
</tr>
<tr>
<td>Private</td>
<td>156</td>
<td>50.6%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>191</td>
<td>62.0%</td>
</tr>
<tr>
<td>Male</td>
<td>117</td>
<td>38.0%</td>
</tr>
<tr>
<td>Internship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taken</td>
<td>175</td>
<td>56.8%</td>
</tr>
<tr>
<td>Not Taken</td>
<td>133</td>
<td>43.2%</td>
</tr>
<tr>
<td>Total</td>
<td>308</td>
<td>100%</td>
</tr>
</tbody>
</table>

Students’ Performance for Server’s Competencies

Vocational junior college F&B students regarded their server’s competencies at a very good level (M = 3.59, SD = .71), all of the competency items were rated more than 3. The top five server’s competencies for college F&B students were attitude performance (M = 4.03, SD = .78), working spirit (M = 3.97, SD = .79), healthy (M = 3.89, SD = .85), appearance (M = 3.88, SD = .77), and mise-en-place (M = 3.84, SD = .76). There were eleven items where the average was lower than 3.5, and students thought that they did not perform that well. The least proficient five competencies are the ability, or the understanding, the sense, the knowledge of language (M = 3.19, SD = .71), fire drilling (M = 3.25, SD = .70), career promotion path (M = 3.28, SD = .90), cost controlling (M = 3.32, SD = .85), and wine knowledge (M = 3.39, SD = .88). (Table 2)

Table 2. The performance at server’s competencies for college F&B students

<table>
<thead>
<tr>
<th>Items</th>
<th>Mean</th>
<th>SD</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>w18. service attitude</td>
<td>4.03</td>
<td>.78</td>
<td>1</td>
</tr>
<tr>
<td>w16. work spirits</td>
<td>3.96</td>
<td>.63</td>
<td>2</td>
</tr>
<tr>
<td>w19. healthy</td>
<td>3.98</td>
<td>.72</td>
<td>3</td>
</tr>
<tr>
<td>w4. appearance</td>
<td>3.88</td>
<td>.59</td>
<td>4</td>
</tr>
<tr>
<td>w20. mise-en place (preparation)</td>
<td>3.84</td>
<td>.58</td>
<td>5</td>
</tr>
<tr>
<td>w26. clearing-up</td>
<td>3.82</td>
<td>.62</td>
<td>6</td>
</tr>
<tr>
<td>w17. self-enriched</td>
<td>3.68</td>
<td>.76</td>
<td>7</td>
</tr>
<tr>
<td>w21. receptive work</td>
<td>3.67</td>
<td>.83</td>
<td>8</td>
</tr>
<tr>
<td>w12. table manner</td>
<td>3.65</td>
<td>.79</td>
<td>9</td>
</tr>
<tr>
<td>w5. cutlery using</td>
<td>3.64</td>
<td>.73</td>
<td>10</td>
</tr>
<tr>
<td>w14. food knowledge</td>
<td>3.62</td>
<td>.85</td>
<td>11</td>
</tr>
<tr>
<td>w23. serving food</td>
<td>3.61</td>
<td>.83</td>
<td>12</td>
</tr>
<tr>
<td>w9. restaurant facility</td>
<td>3.61</td>
<td>.81</td>
<td>12</td>
</tr>
<tr>
<td>w22. order taking</td>
<td>3.59</td>
<td>.79</td>
<td>14</td>
</tr>
<tr>
<td>w2. communication</td>
<td>3.54</td>
<td>.72</td>
<td>15</td>
</tr>
<tr>
<td>w8. restaurant operation</td>
<td>3.49</td>
<td>.81</td>
<td>16</td>
</tr>
<tr>
<td>w3. crisis handling</td>
<td>3.49</td>
<td>.57</td>
<td>16</td>
</tr>
<tr>
<td>w11. environment protecting</td>
<td>3.48</td>
<td>.63</td>
<td>18</td>
</tr>
<tr>
<td>w25. billing</td>
<td>3.47</td>
<td>.60</td>
<td>19</td>
</tr>
<tr>
<td>w24. complaints handling</td>
<td>3.47</td>
<td>.73</td>
<td>19</td>
</tr>
<tr>
<td>w7. sanitation &amp; safety</td>
<td>3.45</td>
<td>.54</td>
<td>21</td>
</tr>
<tr>
<td>w15. wine knowledge</td>
<td>3.43</td>
<td>.78</td>
<td>22</td>
</tr>
<tr>
<td>w13. cost controlling</td>
<td>3.39</td>
<td>.72</td>
<td>23</td>
</tr>
<tr>
<td>w10. career promotion path</td>
<td>3.32</td>
<td>.82</td>
<td>24</td>
</tr>
<tr>
<td>w6. sense of fire drilling</td>
<td>3.28</td>
<td>.51</td>
<td>25</td>
</tr>
<tr>
<td>w1. language</td>
<td>3.19</td>
<td>.51</td>
<td>26</td>
</tr>
</tbody>
</table>

Dimensions of Server’s Competencies

Using factor analysis with varimax by principle extract, the current study finds there are four domains for the server’s competencies named as food serving skills, restaurant operating knowledge, sense of side working, and self-attitude. Students assessed themselves as good waiters with good cognition and proficient operating and serving skills, but as not that competent in terms of operating knowledge. (Table 3)
Table 3. Dimensions of server’s competencies

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Items</th>
<th>Factor Loading</th>
<th>Eigen value</th>
<th>%</th>
<th>Communicative %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food serving skills</td>
<td>w22. order taking</td>
<td>.745</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w21. receptive work</td>
<td>.690</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w23. serving food</td>
<td>.689</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w24. complaints handling</td>
<td>.687</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w25. billing</td>
<td>.606</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w3. crisis handling</td>
<td>.587</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w2. communicating</td>
<td>.577</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>w1. language</td>
<td>.520</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w20. mise-en place</td>
<td>.506</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w2. communicating</td>
<td>.577</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w1. language</td>
<td>.520</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w20. mise-en place</td>
<td>.506</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w13. cost controlling</td>
<td>.710</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w6. fire drilling</td>
<td>.686</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w10. career promotion path</td>
<td>.645</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w7. sanitation &amp; safety</td>
<td>.605</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w8. restaurant operation</td>
<td>.546</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w9. restaurant facility</td>
<td>.532</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w15. wine knowledge</td>
<td>.499</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w14. food knowledge</td>
<td>.395</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restaurant operating knowledge</td>
<td>w26. clearing-up</td>
<td>.714</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w4. appearance</td>
<td>.631</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w5. cutlery using</td>
<td>.590</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w12. table manner</td>
<td>.525</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sense of side working</td>
<td>w17. self-enriched</td>
<td>.715</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w16. work spirits</td>
<td>.695</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w18. service attitude</td>
<td>.658</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w19. healthy</td>
<td>.638</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w11. environment protecting</td>
<td>.493</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal attitude</td>
<td>w17. self-enriched</td>
<td>.715</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w16. work spirits</td>
<td>.695</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w18. service attitude</td>
<td>.658</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w19. healthy</td>
<td>.638</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>w11. environment protecting</td>
<td>.493</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. **Food serving skills**
   There were nine abilities for this category, they were the ability to perform order taking, receptive work, food serving, complaint handling, billing, crisis handling, communication, language, and mise-en-place. This part was skills-oriented at the scene in guest service for working as a waiter or waitress. This category reflected the tasks finished in front of the guest.

2. **Restaurant operating knowledge**
   There were eight competency items for the second category; they were the understanding or knowledge of cost controlling, fire drilling, career path of promotion, sanitation and safety, operational work, facility, wine knowledge, and food knowledge. All of these items concerned the knowledge and laws related to restaurant operation, and the factor loading was greater than 0.4. Although the factor loading of “food knowledge” competency was close to 0.4, it is considered as a basic competency of the industry. This category represented the theoretical part of operating a restaurant.

3. **Sense of side working**
   This part included clearing-up, waiter’s appearance, cutlery use, and table manner. Not the direct serving skills for a server, but these four senses of the side working act as the base to complete a better or even perfect restaurant service. The findings indicated the competency items were neither theory-oriented nor skill-oriented. It identified that the basic domain of sense to be possessed before doing guest serving in the dining room was quite a simple domain to be enhanced.
4. Personal attitude

In this category, the items were all concerned with the sense of attitude for oneself, included self-enriched, working spirit, service attitude, healthy, and environment protecting.

The Proficiency and Difference of Waiter’s Competencies for Students in Different Characteristics

Students assessed themselves as performing well in all four categories. Personal attitude was the best part they performed, \( M=3.81, SD=.63 \) following by the sense of side working \( M=3.76, SD=.60 \), food serving skills \( M=3.54, SD=.59 \), and restaurant operating knowledge \( M=3.43, SD=.58 \). This indicated college students recognized the role of a waiter or waitress in a restaurant. They could complete the side work, make the real serving procedures go smoothly, and perform good serving skills to the guests as well. Although they rated their restaurant operating knowledge as the lowest proficiency among these four categories, it still received a rating of 3.43. (Table 4)

<table>
<thead>
<tr>
<th>Competency dimensions</th>
<th>M</th>
<th>SD</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal attitude</td>
<td>3.81</td>
<td>.63</td>
<td>1</td>
</tr>
<tr>
<td>Sense of side work</td>
<td>3.76</td>
<td>.60</td>
<td>2</td>
</tr>
<tr>
<td>Food serving skills</td>
<td>3.54</td>
<td>.59</td>
<td>3</td>
</tr>
<tr>
<td>Restaurant operating knowledge</td>
<td>3.43</td>
<td>.58</td>
<td>4</td>
</tr>
</tbody>
</table>

There was a significant difference in responses between internship experience, gender but not the school system. There was no statistically significant difference between public and private college students in the proficiency of server’s competencies, though public college students seemed to perform more proficiency than private college students. According to the record of the co-operation business, both students went to the same hotels or restaurants to take their internship. Then it was no surprise that there was no significant difference between these two groups if the business gave both students the same opportunities, the same positions, the same tasks, and the same trainings and etc.

Male students performed better than female students in two categories, restaurant operation knowledge \( M=3.58 > F=3.33, p<0.05 \) and personal attitude showing a significant difference by t-test \( M=3.94 > F=3.78, p<0.05 \). This finding goes along with Lu’s study in 2003. She found male students seemed to have more confidence than female students. Male students assessed themselves as performing better than female students in ten of the fifteen dimensions with a significant difference being found in food & beverage management competencies. Male students have more confidence and perform better than female students in management and operating knowledge, but not in serving skills or side works as a server. This finding corresponded to the results of Lind, Rekkas, Lam, & Beierle’s study made in 2002. They reflected gender differences in self-confidence rather than self-assessment of midclerkship competence.

Internship affected students’ competencies as a server most. (Figure 1) There were significant differences in food serving skills \( \text{with}=3.64 > \text{without}=3.40, p<.05 \), restaurant operating knowledge \( \text{with}=3.56 > \text{without}=3.27, p<.05 \) and sense of side working \( \text{with}=3.89 > \text{without}=3.59, p<.05 \), but no difference in personal attitude \( \text{with}=3.86 > \text{without}=3.74, p>.05 \). It indicated college students recognize their good performance in terms of service attitude no matter what level of internship experience they had. Students recognized their attitude was the best performance among five competency items in this category. This finding seemed to imply internship could improve the professional skills and knowledge but not significantly improve personal attitude. The results were in agreement with the findings of Tsaur, Yung, & Liu’s study. They found that the public faculty recognized the sandwich internship system, which could help students build the required profession skills, and improve their social and job experience (Tsaur, Yung, & Liu, 2000). Also, Collins (2002) has claimed that internship is not only an optional enhancement for the academic record, but also an essential collegiate experience component. Moreover, the study made by Leslie, & Richardson (2000) also found that students recognized the benefits from sandwich work experience though they had benefited from development of customer relations and oral communication the most.

Figure 1. The proficiency in server’s competencies in different internship experience
Hsiao (1993) studied a cooperative vocational high school in 1993 and found the cooperative programs contributed to the components by teachers, students, and graduates, although students had lower mean ratings than teachers and graduates showing a significant difference at the .05 level. Goodman & Sprague (1991) has mentioned that a university education should give students a chance to work in the industry to understand its language, technology, and to develop interpersonal skills. Lefever & Withiam (1998) indicated that internship was strongly supported from respondents who were hospitality practitioners, and pointed out that this was an effective way to make the transition from academia to the industry for students. Clark (2003) also pointed out that internship could give valuable learning experiences for business education. It helps students learn to understand themselves, their jobs, how to integrate theory and practice, and increase their employability when coupled with the academic assignments. The fact that internships help students emphasize their professional competencies is evident in the current study.

Table 5. The difference in servers’ competencies within different students’ characteristics

<table>
<thead>
<tr>
<th>Competency dimensions</th>
<th>Food serving skills</th>
<th>Restaurant operating knowledge</th>
<th>Sense of side work</th>
<th>Personal attitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public (1)</td>
<td>3.58</td>
<td>3.45</td>
<td>3.76</td>
<td>3.83</td>
</tr>
<tr>
<td>Private (2)</td>
<td>3.50</td>
<td>3.41</td>
<td>3.75</td>
<td>3.78</td>
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<td>1.21</td>
<td>0.50</td>
<td>0.26</td>
<td>0.61</td>
</tr>
<tr>
<td>p value</td>
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<td>0.620</td>
<td>0.792</td>
<td>0.541</td>
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</tr>
<tr>
<td>College</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (1)</td>
<td>3.59</td>
<td>3.58</td>
<td>3.80</td>
<td>3.94</td>
</tr>
<tr>
<td>Female (2)</td>
<td>3.51</td>
<td>3.33</td>
<td>3.73</td>
<td>3.73</td>
</tr>
<tr>
<td>t value</td>
<td>1.16</td>
<td>3.70</td>
<td>1.05</td>
<td>2.87</td>
</tr>
<tr>
<td>p value</td>
<td>0.249</td>
<td>0.000*</td>
<td>0.295</td>
<td>0.005*</td>
</tr>
<tr>
<td>Remarks</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Internship</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With (1)</td>
<td>3.64</td>
<td>3.56</td>
<td>3.89</td>
<td>3.86</td>
</tr>
<tr>
<td>Without (2)</td>
<td>3.40</td>
<td>3.27</td>
<td>3.58</td>
<td>3.74</td>
</tr>
<tr>
<td>t value</td>
<td>3.62</td>
<td>4.45</td>
<td>4.57</td>
<td>1.61</td>
</tr>
<tr>
<td>p value</td>
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<td>0.000*</td>
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<td>Remarks</td>
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<td>1 &gt; 2</td>
<td>1 &gt; 2</td>
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</tr>
</tbody>
</table>

*: p<0.05

CONCLUSIONS AND SUGGESTIONS

The current study examined the waiter’s competencies for junior college students who majored in food and beverage management. It found students performed very well in the competencies of a server, and performed better in their professional knowledge and skills after taking internship for six months. Internship plays an important role in developing and improving student’s industry-oriented skills and knowledge. The conclusions were as follows:

1. Vocational junior college students performed very well in server’s competencies; the mean for proficiency was 3.59.
2. There were four dimensions for server’s competency: food serving skills, restaurant operating knowledge, sense of side work, and personal attitude.
3. Vocational junior college students performed best in the domains of personal attitude (M=3.81), then the sense of side work, food serving skills, and lastly restaurant knowledge.
4. The students with internship performed significantly better than students without internship in the domains of food serving skills, restaurant operating knowledge and the sense of side work, but no significant difference was found in the domains of personal attitude.
5. Male students performed significantly better than female students did in the domain of restaurant operating knowledge and personal attitude.
6. There was no significant difference for students studying in public or private colleges.

Upon the completion of the discussion and the conclusion, the current study made the following suggestions:

1. Vocational junior college should continue giving emphasis to the attitude before students take their internship.
2. The policy and system of internships for vocational junior food and beverage students should be maintained. In addition, other vocational schools could take this example for their professional practice and training.
3. Further research should be conducted to identify the competencies items and examine the proficiency of these competencies for college or university students.
as a hostess, a captain, a cashier, a bartender, a wine steward, a manager and other career positions at restaurants.

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Authors

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Effectiveness of Teaching a Design Course with Students from Different Academic Backgrounds

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ABSTRACT

Teamwork, communication skills, CAD skills, and design for manufacturability (DFM) knowledge and skills were ranked respectively as the top four qualities manufacturing employers desire and what entry-level employees lack. To meet these industry needs, a curriculum has been developed as part of a three-year Advanced Technical Education (ATE) project. This curriculum combines DFM, CAD, and teamwork (including communication skills) into one integrated introductory manufacturing design class. As a result of this combination, students learn CAD knowledge and skills in the context of DFM and teamwork. This study investigates the effectiveness of teaching a newly developed introductory manufacturing design curriculum with students from a four-year university and a two-year community college. The major conclusions were reached as follows. Students from both institutions share the same significant improvement in the areas of PSM and DFM. However, with the same allotted time in learning and exercising the PSM knowledge and skills, the four-year students benefited significantly more from the curriculum than the two-year students.

Keywords: CAD, Curriculum, Design for Manufacturing, Teamwork, Employee Skills

INTRODUCTION

Technology is changing how all manufactured products and systems are designed, constructed, and maintained. As technology allows manufacturers to reach new levels of sophistication, industry is requiring technologists and technicians with a wide range of skills, including practical skills like drafting, theoretical skills like Design for Manufacturing (DFM), and communication and teamwork skills. Practitioners with these abilities can integrate better into engineering teams, helping engineering ideas come alive (Jets, 2004).

Technologists and technicians share many responsibilities. Their work differs based on the knowledge and skills they gain through education. Technologists usually obtain a four-year bachelor's degree in technology. Most technicians who want to advance in their field obtain a two-year associate's degree in technology.

In many educational programs that train manufacturing technologists or technicians, the introductory manufacturing design course is one of the most important. This type of course is required for all students majoring in manufacturing at a university or community college and is usually among the first technical classes students take in their college study. It is the foundation for many other design and manufacturing classes (Newcomer, et al., 1999). Therefore, it is imperative for manufacturing educators to carefully plan the content of this course to ensure the best possible foundation for students seeking to enter manufacturing disciplines.

Introductory manufacturing design courses were once more drafting-centered. Students learned hand-sketching skills and used drafting boards. A considerable amount of class time was devoted to drafting and descriptive geometry, which facilitated cooperative communication between design and manufacturing teaching departments (Howell, 1995).

These classes transformed from traditional drafting and descriptive geometry to computer aided design (CAD) systems as the rapid development of easy-to-use computers and CAD software made hand tools obsolete (Ault, 1999; Howell, 1995). With these early CAD systems, students spent time, in addition to learning the course content, learning how to use the CAD software. Now with the current parametric solid modeling (PSM) technology, students spend less time learning software packages and are more productive. Parametric solid modeling has also been linked with enhancing students’ 3-D visualization skills. This lack of 3-D visualization ability has been identified as one of the most important
factors for students having difficulties in manufacturing design courses (Devon, et al., 1994; Howell, 1995; Mohler, 1997; Newcomer, et al, 1999; Sorby, et al, 1999; Strong & Smith, 2002; Wiebe, 1992). The advancement of using PSM allows the traditional introductory CAD class to be reconstructed into a more effective introductory manufacturing design class that incorporates other important technical elements.

Besides CAD skills, other important technical elements related to manufacturing design were suggested in a 1995 survey exploring how to improve manufacturing and design capabilities. In this survey, 66 senior managers from 33 manufacturing companies were asked to rank a list of 56 different “best practices” in order of their importance in the manufacturing workforce. CAD skills were ranked fourth on the list. Teamwork, communication skills, and design for manufacturability (DFM) knowledge and skills were ranked respectively as the top three qualities manufacturing employers desire and what entry-level employees lack (Przirembel, 1995).

To meet these industry needs, a curriculum has been developed as part of a three-year Advanced Technical Education (ATE) project funded by the National Science Foundation (NSF). This curriculum combines DFM, CAD, and teamwork (including communication skills) into one integrated introductory manufacturing design class. As a result of this combination, students learn CAD knowledge and skills in the context of DFM and teamwork.

INTRODUCTION OF THE CURRICULUM

Background

This integrated introductory manufacturing design curriculum development was part of a three-year Advanced Technical Education (ATE) project funded by the NSF. The primary purpose of this project was to improve the method in which introductory manufacturing design class are taught in community college manufacturing education programs and to help these programs better understand and consider how industry demands affect future employees. According to findings by Przirembel (1995), design for manufacturability (DFM), computer-aided design (CAD), teamwork and communication are among the top five skills desirable in industry. Thus, an integrated introductory manufacturing design class was developed combining DFM, CAD, and teamwork (communication is treated as part of teamwork skills in the curriculum). This combination results in CAD knowledge and skills being taught in the context of DFM and teamwork.

Parametric solid modeling has made it much easier to teach CAD concepts than traditional 2D drawing. If a user-friendly software package is used, the actual time spent on CAD teaching is dramatically reduced. The other important concepts (DFM, teamwork, and communication) therefore can be introduced in the same class.

The major targeted student group was community college students with a design or manufacturing degree focus.

Curriculum structure

The curriculum is divided into four modules, each containing lessons covering the three crucial subject areas: PSM software using Autodesk Inventor, DFM, and teamwork. The student must successfully complete each of the modules for a successful completion of the course. The approximate proportion of each subject area in each module is shown in Figure 1.

PURPOSE OF STUDY

The curriculum was initially intended for use at the community college level. However, the researchers believed that industrial technology students in the four-year universities would also benefit from using the integrated curriculum approach. The purpose of the study was to field-test an integrated manufacturing design curriculum at two institutions (a two-year community college and a four-year university), then compare the outcomes of the two groups to determine if the integrated
curriculum can be adopted successfully within two and four-year university programs.

**METHOD**

**Field test sites**

The two institutions selected for field testing the curriculum are located in the Midwest. The two-year community college is considered an urban technical community college. The industrial manufacturing technology program was chosen as the participating program from the two-year college. The four-year university is a comprehensive research university also located in the Midwest. The participating program at the four-year university was an industrial education and technology program. Instructors from each participating program had strong manufacturing design backgrounds with more than three years of CAD course facilitation experience. In addition, both instructors possessed minimal manufacturing knowledge and skills and had not taught teamwork knowledge and skills previously. In order for this deficiency not to affect the study outcome, instructor training was conducted covering PSM software, DFM, and teamwork skills prior to starting the field test. The instruction materials used by the two institutions were completely pre-developed to minimize differences in delivering the curriculum. The complete package included Microsoft PowerPoint presentations, presentation scripts, demonstration sheets, information sheets, and homework assignments.

**Data collection and analysis**

Seven different evaluation instruments were developed in order to evaluate the effectiveness of the instruction at the two institutions. A pre-test composed of these seven instruments was given prior to using the instructional modules, and a post-test was given at the end of the instructional period; thereby, comparing the performance between the two institutions. The seven evaluation instruments (grouped according to subject area) are described in the following sections.

**Parametric Solid Modeling (PSM):**

1. *PSM knowledge test:* A test composed of 20 knowledge-based multiple-choice questions about PSM. Questions are based on general PSM knowledge and specific software commands. This test was developed to measure students’ PSM knowledge. There are 20 total possible points for this test.

2. *PSM skills evaluation (formative test):* The evaluation test evaluated students’ PSM skills with emphasis on software. The students were asked to complete several tasks within a set time interval. The Inventor files created were graded using a grading criterion list designed to assess students’ hands-on PSM skills. There were 144 total possible points for this test.

3. *Mental rotation test:* A mental rotation test with 20 questions was developed to estimate students’ spatial visualization skills. There were 40 total possible points for this test.

**Design For Manufacturability (DFM):**

1. *DFM knowledge test:* A test composed of 18 knowledge-based questions was developed to measure students’ DFM knowledge. There are 18 total possible points for this test.

2. *DFM skill assessment:* A test composed of 18 design-consideration tasks related to Design for Machining/Assembly. There were 54 total possible points for this test.

**Teamwork:**

1. *Teamwork knowledge test:* A test composed of 22 knowledge-based, multiple-choice questions to measure students’ teamwork knowledge. There were 22 total possible points for this test.

2. *Teamwork skill assessment:* A test composed of 14 survey-style questions to evaluate student progress and improvement through the teamwork curriculum. Students were asked to respond to 14, five-point Likert scale questions. The test was comprised of three sections: basic teamwork knowledge (three questions), common teamwork skills (five questions), and team decision-making techniques (six questions).

**ANALYSIS OF RESULTS**

Twelve students from the two-year institution and 25 students from the four-year institution finished the course and participated in both the pre-test and the post-test. Student from both institutions were between the ages of nineteen and twenty-two. The test results, described as follows, were analyzed based on the performance of these students.
Effectiveness of Teaching a Design Course with Students from Different Academic Backgrounds

PSM knowledge and skills

Three tests were conducted to evaluate students’ PSM knowledge and skills before and after the course.

PSM Knowledge Test

Students from both institutions greatly improved their PSM knowledge. The two-year students improved from an average correct response rate of 19.2% to 54.2%; the four-year students improved from 15.8% to 70.2%, see Figure 2. Two-year students improved by 35 percentage points or 182.3% improvement, while four-year students improved by 54.4 percentage points or 344.3% improvement. A t-test showed that students at four-year schools developed more PSM knowledge than students at two-year schools, t = -3.26, p<.001.

Mental Rotation Test

As shown in Figure 4, students from the four-year institution greatly improved their mental rotation skills. They improved from an average points received of 22.3 to 30.5, t = -7.41, p<.001, while the students from the two-year institution improved from 18.6 to 20.3, t = -0.82, p>.05). This indicates that four-year students gained better mental rotation skills than two-year students, t =-2.83, p<.01. Results also showed that success with PSM software skills correlated with success with mental rotation.

DFM knowledge and skills

Two tests were conducted to evaluate students’ DFM knowledge or skills before and after the course.

Figure 2. Improvement Comparison between the two institutions on the PSM Knowledge Test

Figure 3. PSM Software Skill Assessment comparison between the pre-test and the post-test for both institutions

Figure 4. Mental Rotation Test comparison between the pre-test and the post-test for both institutions
DFM Knowledge Test

Students from both institutions greatly improved their DFM knowledge. Two-year students improved from an average correct response rate of 13.0% to 41.7%; four-year students improved from 17.1% to 40.2%, see Figure 5. Two-year students improved by 28.7 percentage points or 220.7%, while four-year students improved by 23.1 percentage points or 135.1%. The data indicates that students in both schools improved about equally in DFM knowledge, t = 1.32, p>.05.

DFM Skill Assessment

As shown in Figure 6, students from both institutions greatly improved their DFM skills. Two-year students improved from an average points received of 22.3 to 40.5, t = 17.22, p<.001; four-year students improved from 22.4 to 38.5, t = 12.99, p<.001. The two-year students improved by 18.2 points, while four-year students improved by 16.1 points. The results indicate that students in both schools improved proportionally in DFM skills, t = -.391, p>.05.

Teamwork knowledge and skills

Two tests were conducted to evaluate students’ teamwork knowledge or skills before and after the course.

Teamwork knowledge test

Students from both institutions greatly improved their teamwork knowledge. Two-year students improved from an average correct response rate of 30.3% to 54.2%; the four-year students improved from 32.4% to 54.9%, see Figure 7. Two-year students improved by 23.9 percentage points or 78.9%, while four-year students improved by 22.5 percentage points or 69.4%. The results indicate that students in both institutions improved equally well in teamwork knowledge and skills, t =.276, p>.05.

Teamwork survey

The results from the teamwork skill assessment were also interesting. Students responded to various questions on a five-point Likert scale, ranging from 1 (little or no awareness of the skill/knowledge/technique), to 5 (much experience/understanding of the skill/knowledge/technique). Both student groups indicated, an average of 4, that high teamwork skill levels had been attained through the integrated curriculum. However, while the four-year students started with better teamwork skills in all three areas, the two-year students finished with better teamwork skills levels, Figure 8.

(A) Part I: Awareness of the importance of the teamwork skills in industry
DISCUSSION AND CONCLUSIONS

From the data analysis of the seven evaluation tests, the results can be summarized as follows:

1. PSM: The four-year institution students improved significantly more in this area than two-year institution students. After interviewing instructors, potential reasons for this difference could be as follows: (a) the program emphasis of the two-year institution student group was that of machining technology while the four-year program emphasized technology using software and hardware; (b) the instructor at the two-year institution indicated being given a heavy teaching load and did not provide any office hours to assist in additional software instruction, conversely; the instructor in four-year program not only provided additional assistance but was assigned a teaching assistant to provide additional student help. The authors believe this issue merits further research.

2. DFM: Students in this area performed much like they did with teamwork skills. However, students from both institutions shared the same significant improvement on both the DFM knowledge test and the DFM skills evaluation. Therefore, it can be easily concluded that the integrated curriculum is effective in teaching four-year students about DFM as much as for two-year students.

3. Teamwork: While both institutions made similar improvements in teamwork knowledge, the two-year students exhibited greater improvement, yet statistically insignificant. However, through the delivery of an integrated curriculum, students in both institutions finished with high levels of teamwork skills in all three areas: awareness of the importance of the teamwork skills in industry, general teamwork skills, and team decision-making skills. It can be concluded that the curriculum is effective in helping improve teamwork skills of two and four-year students.

The aforementioned findings suggest that incorporating teamwork skills and knowledge, as well as DFM skills and knowledge, into an introductory manufacturing design curriculum is beneficial. The delivery format and moduled lesson plans, along with practical and realistic assignments, proved to work well in the two and four-year learning environments for students who seek the competitive edge in the manufacturing industry.

The data showed that the integrated curriculum helped the two-year students excel in teamwork skills over their four-year peers.
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Review of the Literature on Educational Change and Innovation Influencing the Use and Integration of ICTs

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ABSTRACT

New information and communication technologies (ICTs) have dramatically altered the landscape of education at all levels. The present article explores how such technologies are integrated into the classroom environment and also their influences, especially on post-secondary faculty development. The evidence that the potential influence of these technologies is more positive than negative is overwhelming if instructional strategies and techniques are adapted to the new technologies rather than the new technologies merely being grafted onto old methods. Ways of assuring that educators and students benefit from all the new possibilities are explored.

Keywords: Curricula, Educational Technology, Educational Change, Educational Theory, ICT

INTRODUCTION

“What’s next?” asks the cover of the March 20, 2006, issue of Time. Turning inside, to page 63, we find the answer in the headline to the cover story: “The next big thing is us.” The lead article in the larger story, by Lev Grossman, goes on to explain that the process of innovation is undergoing a dramatic change. Whereas before, most innovation came from “experts” in some sense, that may not be the case in the future. In Grossman’s words,

“Things, broadly speaking, used to be invented by a small, shadowy elite. This mysterious group might be called the People Who Happened to Be in the Room at the Time. These people might have been engineers, or sitcom writers, or chefs. They were probably very nice and might have even been very, very smart. But however smart they were, they’re almost certainly no match for a less elite, but much, much larger group: All the People Outside the Room. (p. 65).”

The people outside “the room,” historically speaking, haven’t in the past been responsible for much innovation. We—let’s go ahead and be honest about our place in the world—consume. What we have consumed and bought in the past, of course, has often determined which innovations would be successful and actually make a difference in our lives and in the world at large.

According to Grossman, “…that’s changing. The authorship of innovation is shifting from the Few to the Many.” And it’s happening for no better reason than that it is getting easier and easier to share information about facts, experiences, research, and opinion over very large distances. He offers a few examples: Firefox, an excellent Internet browser developed through open-source collaboration of a great many people, and SourceForge.net, a website that hosts collaborative, open-source work. The latter currently hosts more than 15,000 projects, and anyone who wants to participate, can. Even formerly proprietary innovations are sometimes offered to the larger community for collaboration on further development and to ensure their continued use. Such an example is found in AOL’s (America Online) Instant Messenger, which was thrown to the open-source community early this March.

So why is this working? The first reason is that use of the Internet is expanding rapidly. A lot of it is happening simply because we can do it now. But there is a more important reason: “…a curious phenomenon you could call intellectual altruism. It turns out that given the opportunity, people will donate their time and brainpower to make the world better.” Again, calling on examples, Grossman notes such sites as Wikipedia, an online encyclopedia “…written entirely by anonymous experts donating their expertise. It has the unevenness you’d expect from anything that’s user-created and user-edited, but it’s still the most useful reference resource anywhere on- or off-line (p. 65). In my own experience, writers and editors volunteer their time on-line (see www.allexperts.com) to assist others in getting the syntax right. That’s especially helpful to people such as myself, who must work for a time in a language other than their own. The development of such on-line communities of experts makes possible a level of interaction and breadth of community not before possible.

So what does all this have to do with educational change and especially the development of new strategies in post-secondary faculty education? It opens up all sorts
of possibilities for productive educational change, especially in the areas of initial and continuing professional education. The greatest successes, however, will be to use the communitarian possibilities presented by the new technologies to build really collaborative communities, in which faculty members help guide the collaboration among students and established professionals, contribute their own expertise, and draw on the expertise and ideas of all members of the community.

The methodology in this paper will explore current theories of how educational practices change and innovation is introduced and diffused. The discussion will center on factors that affect the use of information and communication technologies in the classroom and how effectively the post-secondary faculty utilize it to develop and enhance their own skills.

Technology and Theories of Higher Education: A General Overview

During the past decade, both the role and the process of higher education have changed rapidly because of the increasing influence of new information and communication technologies (ICTs). ICTs are radically transforming workplaces and the educational landscape is where changes in the structure and provision of education are apparent (Christie et al., 2002, p.14). This increase in the educational use of ICTs is driven and supported by evidence that new technologies can change schools and improve education. ICTs play an especially important role in the development of a knowledge-based society because they accelerate the speed with which knowledge can be generated and distributed for use. Sustaining and growing such a society requires new kinds of knowledge and skills, and building those over entire societies requires increasing investment in human capital (Weva, 2003).

Andrew Feenberg noted in 2001 that new educational technologies have almost always had critics. Plato, writing about it of course, complained that writing, the latest technological innovation in the education of that time, threatened to undo the value of active exchange between teacher and student (Feenberg 2001). In Plato’s view, writing was a static form of communication; once something was on paper (or perhaps papyrus?) it could not be changed, and responding to a written page was an exercise in futility. Of course, the opposite turned out to be true. Writing facilitated exchanges, albeit slower ones, between students, teachers, and colleagues at great distance. And whole infrastructures and technologies (moveable type, various national postal services, etc.) grew up to facilitate such exchanges.

Nor is the Internet the first such system to encourage rapid exchanges of ideas. Sometimes works of fiction can offer insight into how the world has worked in the past. In Arthur Conan Doyle’s classics of detection, the various Sherlock Holmes series, the detective Holmes frequently posts a query by mail in the morning and receives an answer by return post that afternoon. While a work of fiction, it reflected the real efficiency of the British postal service in the 1890s (Doyle throughout). One is almost tempted to say that with the Internet and e-mail we have regained the efficiency in communication that was once possible in Great Britain more than a century ago.

It is important to note that in order for the promise of the new technologies to be realized, we have to move beyond the notion that they can simply “automate” the process of education and replace teachers with inanimate (or at least nonliving) transmitters of educational content. Feenberg notes that, “The idea of replacing teachers by computers is an old one, but until recently few educational administrators and technologists were convinced.” He goes on to ask, “Why would we want to automate highly skilled educational tasks? …. …the main reason for automating is obvious: to cut costs” (Feenberg 2001, p. 84).

An underlying theme in educational theory and attempts to make education both more effective and more efficient in the West has been that there should be some element of democracy in the process and that it should involve more than merely learning a body of facts. After Plato, John Dewey was one of the foremost proponents of this view. In his seminal book, Democracy and Education, first published in 1916 and revised in 1921, Dewey offered the view that education had a number of functions and characteristics. First, Dewey saw education as a necessity of life. In his view, life is a self-renewing process of acting on the environment to turn its contents to advantage. Living organisms, including human beings, renew themselves constantly, passing along the fruits of their experiences either through genetic transmission of biological characteristics or by the social transmission of learned experience. This latter process is part of what is called education.

Second, education is a “social function.” Through education, we renew the larger structures within which certain types of individuals must exist. Homo sapiens are a social animal, and that implies communities, and perhaps groups of communities within which individuals must live and interact with each other. Through education, we pass along a large part of the structure of such communities.

Third, Dewey views education as “direction.” Through education, we pass along various traditions and habits of doing things. Doing so provides continuity and
a framework within which the new can develop and be assimilated.

Finally, Dewey regards education as growth, and his views in this area may be the most important to our discussion of professional education. Dewey understood that growth implied a certain level of immaturity in order for there to be room for growth. But whereas many regard immaturity and adulthood as fixed conditions, Dewey regarded them as an open-ended continuum. Growth was always possible, and those with greater relative maturity could still learn from those with less (Dewey 1921). In short, neither maturity nor immaturity were absolutes.

Dewey expanded his thoughts on education to encompass almost every aspect of life, yet he returned again and again to the more formal structures of education. Ultimately, he developed a philosophy of education that called for continuous learning in a guided, but democratic environment. In his view, social continuity was possible only in an environment in which learning and traditions were passed along from generation to generation, but in ways that enabled their constant modification and adaptation to current conditions. Free interchange of ideas between all participants was the ideal (Dewey 1921).

This stress on free exchange between interactive participants in the process remains important today. The interactions between peoples and nations on a wide variety of issues have global significance today. Dewey’s recognition of the importance of interconnectedness, interdependence, and interaction has even greater implications for us in a world that is increasingly interconnected (Boisvert 1998, p. 159).

Such a changing educational landscape demands that teachers have high-level knowledge and skills, especially competencies in new technologies. Teachers are increasingly expected to be life-long, autonomous, and self-regulated learners with the ability to adapt readily to changing circumstances (Fullan, 2001a). As new pedagogical approaches and research methods are developed to fully utilize new ICTs, institutions of higher education must aggressively integrate them into their own curricula.

The successful integration of ICTs should result in substantial improvements in teaching and learning models (Granger et al., 2002). ICT-based learning is seen as a particularly dynamic means of providing an instructional tool for delivering subject matter in the curriculum already in place. Ideally, it will become “a catalyst for educational diversity, freedom to learn and equality of opportunity” (Forman et al., 2002, p. 76). To abet truly effective teaching and learning, ICT experts and content providers in regular academic disciplines exchange experiences across boundaries of technology, academic discipline, and culture. Even with the emergence of a global society, however, schools too often still focus narrowly on only national and local resources and issues. A parochial outlook may prevent them from accessing international literature and discovering best professional practices from outside insular societies (McCormick, 1999). To utilize the emerging ICTs effectively, educational management practices must change significantly.

New ICTs have the potential to transform for the better the roles of teacher and learner by means of collaborative learning (Cuban, 2001; McCormick, 2004). Unfortunately, those who would reform school curricula and teaching practices are often in conflict with those who would bring new technologies into the classroom. Without doubt, the new ICTs make possible more intensive teaching and learning processes. But often, such processes are seen by professionals as conflicting with their own self-image. Professionals in many disciplines are used to working independently and relying primarily on their own expertise (Christie et al., 2002; McCormick, 2004). This is especially true of professionals who are educators, and persuading such people to adopt technologies that often appear to have the characteristics of mass production has proven difficult. The result has been a failure to take full advantage of the creative and productive potential of new technologies.

It is probably important to note at this point that the mere advent of ICTs does not, in and of itself, herald a “new paradigm” in education. The ideal of democratization and increased interchange between learner and teacher that is often discussed is as old as the formal discussion of education itself. ICTs merely seem to offer the possibility of increasing the potential and range of interaction between collaborating members of the intellectual community (TERN 2006).

However, increasing the potential and range for interaction between collaborating members of a community is very much different from the earliest conceptions of what computers could do. Early on, they were viewed primarily as calculating and data-storage devices. Only later were they viewed as capable of facilitating rapid growth in the possibility of interactive communication among the members of dynamic virtual communities in cyberspace.

In Feenberg’s view, a primary threat to the effective use of these new technologies in education is that they will be viewed as “mature technologies” before they really are such. His view is that it is necessary to keep open the possibility of innovation at all times, and that crucial to understanding and using ICTs effectively
will be coming to understand how online communities form and how they serve their members (2001, p. 41).

Another important realization is that the “virtual community” is really not a new thing at all. Such communities have existed since people acquired the ability to imagine that those outside their immediate fields of interaction could share goals and interests, and act in concert to bring about desired outcomes (Anderson 1983). An argument can be made that the rapidly expanding use of ICTs merely acts to create new opportunities for forming an already existing kind of community: the virtual community.

Donald Schon

Consonant with this view are the theories concerning professionalism and professional education advanced by Donald Schon. Schon recognized that the rapid changes in both society and technology, professional practices of all kinds were likely to undergo a continuing set of crises. Professionals in all areas were being challenged by nonprofessionals who nevertheless had access to vast amounts of information about many specialties. The autonomy of professionals was challenged by the ready availability of information to what were essentially “amateurs” but who might be very well informed amateurs. In short, the distinction between “expert” and layperson was becoming increasingly blurred (Schon 1983).

Of equal importance, the body of knowledge associated with most professions was increasingly not found in the academic specialization of school. Rather, it lay in the accumulated knowledge of professional practice itself. Schon developed a theoretical construct to account for how this develops. Among other things, he denied that professional practitioners essentially took “time outs” for research. Rather, their reflection and research was a continual process of problem-solving within their professional practices. Confronted with a puzzle in their practices, or with a philosophical question of how their practices actually worked, they didn’t stop practicing to think about it. Instead, they continued with their practices—whether law, architecture, education, medicine, whatever; Schon sees all professional practice as being essentially design—while reflecting within the practical parameters of getting the present job done (Waks 2001, p. 40).

Schon’s view of reflection, then, differs from Dewey’s, even though Schon’s own professional career and thinking were considerably influenced by Dewey. For Dewey, reflection remained similar to traditional scientific methods of observation and experimentation within a formal structure of discovery. For Schon, the most meaningful reflection occurs in the sometimes messy environment of continuing professional practice.

Schon’s view of reflection is consistent with the views of Dewey and Fullan, however, in important ways. If teachers think of curriculum development as constructing a sequence of learning experiences and education as a process that has no end beyond itself (Dewey, 1966, p. 50), it is immediately obvious that no one can consistently control the experiences of individual students (Fullan, 2001b). That is especially true in both initial and continuing professional education, where students come to the experience with a considerable, and increasing, body of knowledge based on experience already in hand. While it is true that it remains the job of the teacher to facilitate the acquisition of specific skills and knowledge, the more appropriate pedagogical approach will probably involve lively interaction between both teacher and student and within the community of students.

Schon’s views of design bear directly on the structure of professional education. First, he broadens the meaning of design to include the discovery of “a framework of meaning” within a previously indeterminate set of circumstances. From this, he draws three conclusions:

1. Design is learnable but not didactically or discursively teachable: it can be learned only in and through the practical operations of frame experimentation.
2. Design is holistic: its parts cannot be learned in isolation. Rather, it must be learned as a whole, in a molecular way, because to design is to work toward a pattern, a coherent order, a world of meaning comprising all components of a situation.
3. Designing depends upon the ability to recognize desirable and undesirable qualities of the discovered world. But novice students do not possess this ability, and it cannot be conveyed to them by verbal descriptions. (Waks 2001, p. 44)

Drawing from this, Schon takes the view that teachers of professionals should act mostly as coaches. They are proficient in their disciplines, whether architecture, law, or other, but they are not likely to have had specific training as educators. They should facilitate learning by doing—the reflective practice that forms the core of Schon’s educational philosophy (Waks 2001, p. 47). In practice, such learning by doing seems likely to take place in a highly interactive environment, one in which students and teachers are continuously in feedback loops with each other, and in which students, who are also practitioners, albeit at a junior level, share their work and ideas with each other.
Larry Cuban

Larry Cuban has studied the use of computers in education extensively. While his work is primarily with elementary and secondary education, it has direct relevance on the question of how computers can be used effectively in professional education. Cuban notes there are “levels of technology integration” in all areas of endeavor, but his particular adaptation is in elementary education. These levels are:

Entry: Teachers are beginning users of computers
Adoption: Teachers are still bound to traditional models, but provide some instruction in the use of computers.
Adaptation: Traditional models still dominate, but time is allowed for using computers for homework and class work.
Appropriation: Teachers regularly integrate the technology into the curriculum, Invention: Teachers find new ways to connect students and use project-based and interdisciplinary approaches to instruction. (Cuban 2001, pp. 53–54)

Cuban’s studies were conducted in Silicon Valley, one of the places where adoption of computer technology might be expected to be the most advanced. The results were disappointing. Few teachers or schools had progressed beyond the “adoption” phase with the new technology even though the students in those schools could have been expected to have parents who were both well versed in the new technologies and who might be expected to insist on their integration into the process of education (Cuban 2001).

Cuban’s findings confirm at that level what is suspected at many levels of education. Schools and universities have been among the most eager to “adopt” the new technologies associated with computers. But adoption does not necessarily mean change in directions that truly use the new technologies effectively.

These findings are not surprising given Cuban’s earlier writings on “curriculum reform.” Indeed, Cuban seems to take a rather jaundiced view of organized efforts at curriculum reform in general, viewing them as largely fruitless. In Cuban’s view, the formal, state-required curriculum is one of only four curricula to be found in most schools. He offers the following levels of curricula confronted by students:

“The Official Curriculum. This is the officially sanctioned curriculum as defined by the state and the district. It is supported by such things as defined course outlines and approved textbooks.”

“The Taught Curriculum. Teachers work alone in their classrooms and enjoy considerable autonomy even within a defined curriculum. Their attitudes toward what they teach and the relative time spent are often stronger cues to students than the official curriculum. There may be, probably is, considerable overlap between the two, but they will by no means be identical.”

“The Learned Curriculum. This is in addition to the particular behavioral objective revealed in success or failure on standardized tests. There is a lot of collateral learning that takes place beyond what teachers, the state, or the school district intend.”

“The Tested Curriculum. This is the curriculum that results when teachers adapt their classroom content to what is known about the tests that may be required as measures of student (and, by implication, teacher) performance.”

Again, Cuban was theorizing at the grade-school and secondary levels, but it seems likely that his views regarding multiple curricula are readily generalizable to education at other levels as well. It is highly likely that curriculum reform at any of these levels will have less effect than what is aimed for. In Cuban’s view, this is at least in part because curriculum reform ignores the importance of pedagogy in education. In his words,

“[Reformers] believe that content is more important than teaching. They are wrong. At the heart of schooling is the personal relationship between teacher and students that develops over matters of content. Of course, Jaime Escalante taught math, but it was his belief in his students and the power of his personality harnessed to a way of teaching that inspired his students in Los Angeles’ Garfield High School to work hard at calculus. Ask parents why their children work their hearts out for a football coach, band instructor, or science teacher. They will point to the personal connection that these teachers have with their students and to the way these bonds permeate daily teaching.

Researchers have known for years that three teachers teaching 11th-grade English in the same school from the same textbook will have three different classes. Variation in what is taught comes from the differences in teachers' personal traits, from their beliefs about how English ought to be taught, from their attitudes toward students, from their teaching skills,
from their knowledge of subject matter, and from their experiences. (Cuban 1993)."

Cuban advocates for public schools to have two strategies. First, he believes educators must honestly acknowledge the existence of multiple curricula and foster a recognition throughout society that no curriculum is of value in an educational setting in which the relationship between student and teacher is nonexistent or negative. Second, he believes that efforts at curriculum reform must be integrated with “…efforts to build the capacity of teachers to create, use, and choose their own materials” (Cuban 1993). In this way, the abilities of teachers to motivate and inspire their students will be enhanced, and the general process of building a learning community will be fostered as well. It seems highly likely that such an approach could be adapted to professional education, even distance professional education.

Barbara Means

Barbara Means (1994) notes that technology and educational reform “can, under the right conditions, become mutually reinforcing partners in support of students learning” (p. xii, xiii). She challenges the presumption that teacher training programs should not teach prospective teachers about technology and advocates using technology throughout teacher training programs so that prospective teachers gain technological skills and experience how technology can support the exploration, organization, and communication of knowledge through natural and discovery approaches.

Additional Views

At the same time, the introduction of technology into the educational process can impede learning, and especially the kinds of creative give and take that will lead to the development of a truly continuous learning community. Denis Newman (1994) and Joan Herman (1994) note that telecommuting provides new ways of learning and teaching. They argue that schools err by training future teachers to rely on technology and equipment rather than an instructional approach that incorporates planning, design, execution, and feedback. The practical result is to eschew direct instruction in favor of either cooperative or collaborative learning, which leads to the pursuit of such discrete goals as operating coursework or personal amusement. They contend that instructional technologies must shoulder a significant amount of responsibility for the failures of education reform.

Newman views the potential rigidity of technology itself as a potential impediment to effective teaching and learning, and offers a variety of technologies in his “integrated learning systems” approach to designing instructional tools. He hopes these technologies “will transform classrooms, provide patient tutors for each student, and enliven learning with graphics and interactive video” (p. 57). While the conceptual framework could be applied to both elementary and secondary education, Newman’s focus is on higher and adult education programs that are appropriate to the distance-learning environment of the Internet and geared to the convenience of adults. He sees two serious roadblocks to the use of local area networks (LANs): they “inhibit restructuring,” and “current telecomputing technology inhibits wide access by the schools” (Newman, 1994, p. 61). In his view, network-learning systems should be developed to help adult and professional students meet their roles’ highly complex needs and solve difficult problems. In Newman’s view, “It is not enough to retrain teachers or to restructure work environments [so] the teachers can make better use of the technology. We may have to redesign the technology itself so that it becomes part of the solution rather than part of the problem” (Newman, 1994, p. 76).

In part, the potential difficulties of integrating technology effectively into a learning environment may have to do with the where the school and faculty are regarding Cuban’s stages of technology integration. Schools and faculty that have progressed to the higher levels of technology will, almost by definition, be using technological solutions to foster, rather than impede, learning and a productive interaction between teachers and students and other students. This will likely be especially true at the level of professional education.

Feenberg, whose writings we have already turned to in another context, offered what he called a “radical democratic politics of technology” in order to use the new technologies effectively. Building on the argument that technology cannot be neutral but is always a product of the context in which it is used; Feenberg is concerned with preventing “privileged actors” from co-opting the process of technological innovation, especially in education. He sees two possible outcomes from the introduction of new technology:

“Conservation of hierarchy: Social hierarchy can generally be preserved and reproduced as new technology is introduced. This principle explains the extraordinary continuity of power in advanced capitalist societies over the past several generations, made possible by technocratic strategies of modernization despite enormous technical changes.”

“Democratic rationalization: New technology can also be used to undermine the existing social hierarchy or to force it to meet needs it
has ignored. This principle explains the technical initiatives that often accompany the structural reforms pursued by union, environmental, and other social movements. (Feenberg 1999, p. 76)."

Feenberg, of course, is concerned with overthrowing the hegemony of the traditional capitalist organizational structure. In Feenberg’s view, the democratic and extremely fragmented nature of the Internet, with its capability of bringing many disparate groups together in common cause, offers the possibility of overthrowing the traditional hierarchy. Tyler Veak, of Virginia Tech, is not so sure. While granting that the Internet has been characterized at least in part by an almost anarchic and freewheeling exchange of information, he sees that the range of organizations and individuals who can truly influence the course of the Internet’s future development is narrowing significantly. Already, he notes, commercial interests dominate the Internet. As important, he feels, is the cost to participate at all. At the time he was writing, he put the up-front cost at $2,000.00 (the price of a decent PC) plus $20.00 per month in subscription services (Veak 2000, pp. 230–232). He is only partly right. Both the start-up costs and the subscriptions have dropped dramatically, especially for dialup services. Still, it cannot be argued that the traditional large corporate players are increasingly asserting their dominance in refining and redefining the Internet. Typical of this is the recent move by telecommunications companies, who provide the “backbone” of Internet services, to charge differentially for “tiered” Internet service, a move that is being vigorously resisted by such players as Google and other independent content providers.

Robert McCormick and his colleagues have addressed the process of teaching design directly. They are skeptical of there being such a thing as an all-encompassing “design process” that can be adapted to different disciplines and contexts. Rather, they say, any discipline is likely to yield many different ways to solve the same problem. More likely, they say, problem-solving procedures are likely to be particular to the disciplines in which they are undertaken. In short, they are determined by the context. Moreover, even within a particular discipline, there are likely to be many ways to solve the same problems (McCormick & Hennessey, in Barnes 2002, pp. 17–18).

Building on this view of the unlikely unity of a single “design” process, McCormick has noted the difficulty of process and content in design and technology. In his view, there has been an unfortunate tendency in curriculum development to focus on process rather than on knowledge. In the words of Sayers, [McCormick] contrasts the sorts of knowledge that we use, with knowledge that is held in our heads, and makes use of the term ‘qualitative knowledge’ to cover propositional knowledge that is made available to be used in a problem-solving situation. He also shows that we cannot assume that things we teach about science and mathematics can be transferred easily to pupils’ work in design and technology. He uses examples to show how conceptual knowledge is dependent on the context in which it is learnt, and argues that explicit links need to be forged that will help learners move the concepts and ideas to a foreign context. His message to teachers seems to be good practice: articulate your qualitative reasoning, especially when you are trying to help pupils understand how to get things to work.… (Sayers 2002, p. 115)

Getting things to work would certainly be a consideration in any curriculum having to do with design. Architecture is such a field. It further seems that McCormick’s concerns would best be met in an environment that used new technologies to foster free and open interchanges between all the participants in the educational process. Doing so would open the door as widely as possible to the discovery of multiple approaches to particular problems, and both students and teachers would be able to draw on the experiences of everyone in the study group.

CONCLUSION

So where does that leave us with regard to integrating ICTs into professional education? At all levels, researchers and theorists have noted that the new technologies can be a two-edged sword: they can significantly change educational practices for the better, or they can fail to do so and perhaps even leave it worse off. Various researches have noted teachers’ inadequate knowledge of new technologies in many instances, a misguided focus on technology-integrated curriculum reform where the first need may be for greater freedom and flexibility in defining the content at the level of the class, teacher-centered classroom curricula, and a general attitude of complacency as important contributing factors to the lack of achievement and learning in the educational system. Gil (2004), for example, argues that all our attempts toward educational reform are doomed to fail because they rest on an unexamined assumption and separate the use of technology and education reform. According to Means (1994), we take for granted that we live in a time of great technological advance and that schools are the best places for education to occur. With this basic axiom left unexamined, we should not continue putting more money and effort into reforming existing
School reform should focus on encouraging free enquiry and critical thinking, with the goal of increasing creativity, imagination, and innovation, and this within the framework of creating a critical pedagogy for the information and communication technologies age (Sarason, 1990). The literature provides an overview of opinions on assessing the impact of ICTs on the learning environment and many valuable answers to the questions involved in an assessment of educational technology. More importantly, many studies have provided the insight necessary to enable individuals to formulate the appropriate questions. Numerous studies have identified collaborative effort and interdisciplinary approaches as the keys for democracy in diverse societies that share the need for education transformation (Parker, 2004; Dirckinck-Holmfeld & Lorentsen, 2003; Laferrière, 2001; Means & Olson, 1994). Davidson (2003) brings an increased understanding of how multiple knowledge-based forces of diversity, ethnicity, technology, and culture interact to influence school transformation; and Willinsky (2002) has implied we need a new dialogue and a certain level of formal education in order to participate effectively in a modern democratic society.

There is little doubt that information and communication technologies have become ubiquitous in the educational community, and nowhere is this more so than in professional education. That is especially true in distance-learning environments as this has come to characterize professional education and professional continuing education. The real question is whether these technologies are being used effectively to promote a free exchange across the usual learning boundaries or whether they have merely been tacked on to the existing educational structure without realizing their true potential.

Architectural education in Taiwan should make an excellent laboratory for discovering the extent to which ICTs are effectively integrated into such programs. Taiwan exhibits attributes that make it an ideal case study. First, it is relatively isolated from much of the rest of the world physically, and its political relationship with the mainland has encouraged a certain amount of political isolation as well. These factors have encouraged a certain provincialism and attention to parochial interests. Second, there is a certain traditionalism that has survived even the juxtaposition of the two societies that inhabit the island: native Taiwanese and the mainland Chinese who immigrated in the late 1940s and their descendants. Finally, despite its relative isolation and attention to tradition, the island nation has eagerly grasped the emerging technologies and become a major manufacturing base for them. It has first-hand knowledge of the economic potential of the new technologies.

Kathleen Busick, writing in 1994 about educational change in the United States Pacific Territories, noted,
The real meaning of change lies in its human, not its material, dimension. … research about people in the process of change suggests that a period of anxiety is part of the change process, and that people often change their practices before they change their beliefs and understanding. (Busick 1994, p.5)

Noting Fullan’s assertions that change is multidimensional, she and her colleagues drew on his stages and levels of change to develop a “change matrix.” This matrix, or something similar and based on Fullan’s stages of integration, may very well be useful in framing research questions regarding the degree to which technology has been integrated into professional architecture in Taiwan. The matrix is shown as table 1:

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<tr>
<th>Dimensions of Change</th>
<th>Isolated</th>
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<th>Collaborative</th>
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<td>Surface</td>
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<td>Practices/Behaviors</td>
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(Busick 1994, p. 5)

So, the question for a researcher seeking to determine the state and effectiveness of ICT integration in professional architecture in Taiwanese universities might very well design a study to determine the stage of development. A systematic approach to such questions could contribute to developing a framework for implementing more effective use of ICTs.

The choice to use ICTs for curriculum construction has both a conceptual and a utilitarian rationale. As emerging information and communication technologies expand the dimensions of the classroom, demands increase that education professionals be familiar with not only their potential but their application as well. Because what is required of an individual to be technologically literate is something of a moving target, creating a curriculum in a constantly changing digital environment constitutes the kind of ongoing learning process encouraged by constructivist pedagogy. Providing quality education should be the ultimate target of educators, and all educators should actively seek to use the strengths of information and communication technologies in reaching that goal. Reform of school education should result in a consistent curriculum in which use of new information and communication technologies is defined by cautious assessment followed by adoption of a well-planned, diversified, and practical curriculum. Such an approach will enable the use of new technologies to balance teaching, learning, and knowledge, as well as foster creative expression by students. This will help improve their competitive stance.

Can instructional technology realize its potential to transform professional education and continuing professional education? The potential of new information and communication technologies is already affecting how schools attempt to provide opportunities for traditional students and for adults to return to school and acquire new knowledge. As educators, we must encourage everyone toward continuous growth and learning. By doing so, we will raise living standards for everyone, speed national development, and perhaps even ensure the survival of our society.

This essay began with the observation that the very openness of the many new Information and Communication Technologies would make us all contributors to the creative process. Perhaps in no area is that more appropriate than in the areas professional education and continuing professional education in architecture. The possibilities are almost endless for professionals and their clients to collaborate in creating new and innovative uses of space. Furthermore, ICTs can make it possible to extend that collaboration in important ways. Those who guide the development of such professionals should, by their own example, show how collaborative uses of these technologies can extend the processes of invention.

REFERENCES

Tsung-juang Wang holds a diploma in Architecture from China University of Technology. He received the B.S. and the M.S. degree from Middle Tennessee State University, USA and the Ph. D. degrees in engineering technologies from the University of Northern Iowa, USA, in 1993 and Ph. D. studies in education from the University of British Columbia. Since 1993 he has been on the faculty of the department of architecture at National Taipei University of Technology, Taipei, Taiwan, where he is currently an associate professor. He was a visiting scholar in Graduate School of Community and Regional Planning, University of British Columbia and Graduate School of Interactive Arts and Technology during the academic year of 2000-2001 and 2004-2005 respectively. His research integrates aspects of architecture, sustainable environment and education, and the learning, knowledge, & ICTs. He is also name listed in the “Asian Admirable Achievers” 2007 biographical directories published by Rifacimento International.
Learning Work

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ABSTRACT

This paper argues that much of the theoretical writings about learning and work are, at best, only a beginning in this now topical and serious area of research and development internationally. By examining the multiple meanings of the two major terms, “work” and “learning” and relating these to the emergence of a range of theoretical perspectives on the approaches being employed and concepts arising from recent international research, the paper suggests some possible pathways for further consideration of the theoretical basis for study in this field. Theory and research surrounding “workplace” and “work-based” learning has drawn on such theory areas as, social constructivist positions (Billett, 2001), situated learning (Lave and Wenger, 1991) and communities of practice (Wenger, 1998) in recent years. What has emerged is a somewhat less than coherent set of ideas, implications and practical socially situated arguments about where “Learning work” takes place. Questions that arise include: Is the workplace / work-based learning occurring through work, at work, in work or about work? Is such learning a legitimate peripheral activity in a social grouping or more? Is the learner an agent of their own learning or merely a peripheral participant in a socialization process amongst a community of practitioners? Additional central issues arise about the Place of work and learning as well: What is work? What is learning work? Where is the learner situated? Is the learner central to the action; is the learner peripheral, marginalized in the experience? Who has the ‘agency’ in learning? The authors draw upon their own research into workplace/ workplace learning from Australia and the UK in this paper to raise issues about the theoretical and practical implications of answers to many of these issues. This paper takes a critical stance and calls for consideration of better models to frame research on work and learning and the various intersections these two concepts give rise to in training and education.

Keywords: work, learning, workplace, work-based, situated learning, learning work

INTRODUCTION

Work, Learning, Work-based and Workplace Learning are all terms which have a currency and recency of vogue in Education, Vocational Education, Business Education and Training across the world. We are arguing in this paper that some reconsideration of their usage, and therefore meanings, is a necessary element of the debates which should inform and underpin the theoretical aspects of this field of study at this stage of its development in the early years of the 21st century.

We argue in this paper that there are serious issues surrounding the idea of both the understanding of the terms Learning and Work and the location effect upon learning embedded within the literature on workplace learning or learning at work.

Questions arise about the assumptions underlying just what meaning is attached to the term Learning, and how the learners who are assumed to be participating in this learning are actually taking part in the processes which the term learning covers. Questions will also be raised as discussion points about the nature and intent of learners learning in relation to work. In the first instance some clarification needs to be undertaken as to what we mean by the terms “Learning” and “work”. Secondly, we pursue the manifold aspects surrounding workplace learning as a conjunction of these two terms. We will consider such issues as:

Do we learn at work?
Do we learn about work?
Do we learn through work?
Do we learn in work?
Or, as our title for this paper implies, Do we learn work?

These questions raise further issues about Place and the interaction of learner with social settings and workplaces. In addition, we question the way the two related (and for some writers synonymous terms) work-based learning and workplace learning are defined and understood in the literature and what effect this may have had on the theorising of the basic concepts within the field.

These questions will focus our discussion of the theories and implications they have for further debate. We will also endeavour to locate the position we are advocating within the range of theoretical traditions evident in the workplace learning field (as we will
characterise the overview from here on in the paper) that have been dominant so far in the literature.

Finally, we argue that an evolved model of theory and meaning should be carefully employed in the field to assist us all in expanding our research and practice agenda.

Throughout our paper we will also endeavour to offer some examples drawn in part from our own research and that of related groups/research students we are working with currently, to illustrate our points.

This paper is intended to provoke further debate in the field.

Background to the Traditions, Theories and Issues

1: Learning

Learning, as a term is core to the whole enterprise of education and humanity. To tritely define it in some simplistic terms would be tantamount to the theologian defining faith. Suffice it to write in this paper that the conceptualisation of learning as a life adventure and possibly one of the key elements of what makes humans able to survive and thrive, is a given.

But, and it is a large exception taken, the ideology of where learning fits in the life adventure that all humans pursue is the first vexing question for us in this paper.

We are all familiar with the notion of Lifelong Learning (Faure et al, 1972; Delors, et al, 1996) where, as Delors and his commission put it;

The concept of learning throughout life thus emerges as one of the keys to the twenty-first century. It goes beyond the traditional distinction between initial and continuing education. It meets the challenges posed by a rapidly changing world (p 20).

Delors and his UNESCO Commissioners came up with the idea of “Four Pillars” of Learning in their report, Learning: The Treasure Within. The Four Pillars were presented as:

1. Learning to live together
2. Learning to know
3. Learning to do
4. Learning to be

Interestingly, the last pillar was also the title of the Faure UNESCO report from 1972, Learning to be. The idea encapsulated in Delors et al’s report title of learning being a “treasure within” will, we hope feature later in this paper as an understanding of what we are positing.

For some, the third pillar, Learning to do, evoked ideas of learning at work or the whole sphere of experiential learning. For others it was merely the expression covering activity and skilled performance. Whatever the four pillars represented to the many, they nevertheless were all broad and generalised enough to attain multiple meanings that may or may not have been helpful to the world in the long term.

In addition, there is an implicit assumption in this report, and in most writings about Learning, that to learn is to develop positively and that all learning experiences are fortuitous or at least benign. This is a naïve and at times shockingly false assumption. Attitudes, values and much of the manifold evils of humankind could be described as learned. All the “isms” such as racism, ageism, sexism, as well as the social “evils” of violence, war-making, hate, jealousy, greed, and avarice could be said to be learning that is not positive, and certainly not benign in its effects and impact.

Lifelong Learning as a term describing ongoing time involvement in learning has had considerable usage, but its currency has been somewhat cheapened by the fact that it is now such a well known and used term that it has become an almost indisputable truism as a goal and idea.

Lifewide Learning has developed more recently as a sort of tangential but related notion where a broader-based learning is considered to be advantageous. Some recent changes advocated in curriculum in places as diverse as Hong Kong and Australian states, have drawn on the Lifewide Learning rationale to promote curriculum change in the schooling systems that emphasises more “generic skills, values and attitudes” than previously dominant content or discipline-linked knowledge areas. In what appears to be a related development there has emerged a set of terms under a banner of “New Learning” (Simons, Van der Linden and Duffy, 2000; de Kock, Sleegers and Voeten, 2004) which seem to emphasise broader generic abilities and dispositions.

One author, Peter Vaill (1996), took the centrality of Learning in life a little further in his book entitled Learning as a Way of Being. As Vaill puts it, this phrase covers the ideas of a total or holistic understanding that learning is the essence of humanity and pervades all we do, particularly in the modern turbulent era of what he calls the world of permanent whitewater (p42).

In the phrase learning as a way of being, being refers to the whole person – to something that goes on all the time and that extends into all aspects of a person’s life; it means all our levels of awareness and, indeed, must include our unconscious minds. If learning as a way of
being is a mode for everyone, being then must include interpersonal being as well as personal socially expressive being – my learning as a way of being will somehow exist in relation to your learning as a way of being. In short, there are no boundaries to being. There is not something about a human of which we would say, “This is not part of human being”. Clearly, learning as a way of being is a very capacious idea (p.43).

Of course, the very modern medium of major importance that is the e learning phenomenon brings another element that has had increasingly significant impact on all our thinking about places for learning and what learning can be. The potential to revolutionise learning across all sites and places embedded within this notion and its gradual realisation in this century will be the necessary subject of a further paper.

There has also been a tradition of examining Learning as it contributes to the euphemistically described “World of work” which is presented as one half of a dichotomy between personal life space and the role one plays in an employment scenario. Here, the terminology can often slip to “learning to earn”, or “working to learn” as ways to attempt to describe what the relationship is between these two spheres of modern life. We will return to issues surrounding this aspect further on in the paper.

Learning Theories

We do not intend to offer a “Cook’s Tour” of the vast range of Learning theories extant in the literature but instead, will focus on a few key ideas and learning theoretical positions that have influenced the workplace learning field in recent years.

Fundamental to our position in this paper is an understanding of the relative positioning of the Learner in relation to the Learning process.

The history of Learning and Learning theories is replete with examples of theories where the learner, as a recipient of knowledge skills and possibly attitudes is the vessel or the tablet on which learning is writ large and clear. This tradition is often described as the transmission model and to our discredit is still frequently evidenced in classrooms across the world. This “model” and its associated critiques has given rise to many metaphors for learning and teaching, (Tuohy, 1999) which range from the learning being seen as a garden with a teacher/gardener to an orchestra metaphor with a teacher/conductor. Most of these metaphors have been singularly unhelpful to any understanding of learners learning.

Learning theories, we are told, (Bigge and Sharmis 1999) range from those that emphasise the “inner learner” in terms of cognitive and developmental theories such as Piagetian thinking, through external behaviour theories such as Skinner’s Operant ideas, to Socio-historical or Cultural-historical viewpoints such as Vygotsky (interestingly one of his greatest works was entitled Mind in Society, 1978), and Bruner’s Cognitive-Interactionist theories, to Bandura’s Social-Cognitive Learning Theory to the more recent emergence of Lave and Wenger’s (1991) situated cognition view of the world of Learning where learners are socially situated and learn in a form of apprentice peripheral mode from experienced full members of a social grouping.

Figure 1 offers a brief representation of the range of possible Dichotomous Dimensions of Influence, as we have described the various dimensions we have identified as influential in thinking in the field. We argue that these influential dimensions have a distinct and impressive influence on the theoretical and modelling aspects in learning theory and as a consequence in workplace learning theory.
Figure 2 The Intersection of Theoretical emphases in Learning and Thinking

Figure 2 takes this consideration a little further by proposing a diagram which depicts the intersection of relevant theoretical emphases in Learning and Thinking as dimensional elements.

Finally, Figure 3 tries to arrange the various theorists and their ideas on a grid where the dimensions are related to each other and the theories.
There are a number of significant dimensions of learning theories and some hybrid models which have been highlighted over the years. This Figure attempts to position some of the key theorists as representative of their theoretical positions when considering some of these dimensions and the relative emphases as end points.

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*The newer Breed of Models and Theories*
- Engestrom
- Illeris
- Marton

![Figure 3 Learning Theories](image)

Figure 3 offers a rough position map, which attempts to relate the various theorists (and some in different decade guises) along a set of dimensions. This Figure is meant to emphasise some of the key differences among the various theories and theorists rather than be an attempt at a serious scale positioning.

The essential element of difference among most of these various models and interpretations of human learning lies in a tension between the centrality or otherwise of the individual mind and the socio-cultural impact of the context within which the human is interacting. This is not just an extension of the Cartesian “mind/body” dichotomy or dualism (which Nonaka and Takeuchi (1995), accuse Western thinkers of being dominated by in our thinking and thereby missing a large and significant boat!), but more of an ideological tension between the personal and social interaction as emphases.

Some writers have attempted to deal with this dichotomous issue by developing theories and models which employ different emphases and approaches to human learning which involve an interaction between mind and society aspects in various ways. These include Engestrom’s Activity Theory approach (Cole
and Engestrom1993; Engestrom and Cole, 1997; Engestrom, 1999), Illeris’s three dimension model (Illeris, 2002; 2003) and Salamon’s (1993) reciprocal model and possibly Marton’s Phenomenography (Marton and Booth, 1997) and Mezirow’s Transformational Learning Model. (Mezirow, 1978; 1981).

Some of these approaches have emphasised a form of interaction between the individual mind of the learner and the social influences/distributed cognitions in society (eg Salamon), whilst others speak of an “integration” of two processes (Illeris). These two processes are the “external interaction process between the learner and his or her social, cultural or material environment, and an internal psychological process of acquisition and elaboration” (p.398, Illeris, 2003).

What emerges, for this paper, is that the consideration of learning being understood to involve as theory, an “either or” approach to being situated within a social context and process versus being an individual’s construction of meaning, should be a non issue. The question, for us, is not a matter of “single-person processes versus learning within ensembles” as Granott (1998) rather quaintly put it, but rather, as learners move into adulthood and move into a lifestyle and pattern that differs from childhood and schooling learning site interaction, what personal and social interaction and behaviour leads to learning?

The idea that learning is an interaction between an agentic individual’s mind and a socially constructed community of learning practice is at the core of what we are proposing as a better way forward in this theory quagmire. Whilst this view is easily traced through the theories above, we argue that there needs to be a re-emphasis of the interaction between the learner as an active agent and the social situation they are learning within so that there is a better understanding of the reciprocal nature of such learning in action. The adult learner, as an embodied and aware or mindful interactor with his/her social milieu is the rub of the argument at this stage (Varela, Thompson and Rosch, 1993; Langer, 1989)

We would argue then that Learning, in this vein, is the outcome of an enabled active intentional interactional engagement in experience and thinking.

Let us now turn to the second contentious area in the paper, Work.

Background to the Traditions, Theories and Issues 2: Work and Workplaces

As life has evolved from the 19th century through to this the 21st century the whole notion of what people do, as associated with the term work, has become the way many define themselves. At social functions, quite often the first question after introductions to a new acquaintance is “And what do you do?” That this has become a genre is unfortunate as well as trite.

The industrial revolution brought with it the shift in life from home, simple production and barter systems between agrarian existences, to the advent of production centres (work houses, factories and places of employment). This shift moved into the 20th century to the Ford and Post Ford eras where assembly lines, mass production and evolved practices and related support services for “industry” became the staple of Western “civilisation”. That the large western economies, which were built on these premises, are now contracting in the manufacturing areas whilst some eastern large population nations are replacing their workforces offshore, is an interesting development in the history of work. We have, for many years in the past two centuries, taken the idea of work and its meaning largely for granted. Work also has been seen in many other non-western societies as a key element of life and in some is not differentiated from the rest of what we do in daily existence (Reagan, 2000). The term work was not debated nor discussed as a special aspect of life in most areas of Business theory and Management. Even a Dictionary of Management Terms from 1983 does not have “work” as a term for definition (Anderson, 1983), though it does define some related areas.

In these contexts the term work and workplace became associated almost solely with the idea of a place of employment. Work was where an individual was employed and produced, through their efforts, some activity, product or outcome that was remunerated by an employer. We even generated the ubiquitous term “self-employed” to apply to people who “worked for themselves” and the worse “domestic duties” for the stay at home mother and child raiser with the latter being seen in most modern western societies as non-work in the economic sense (feminist writers have had a lot to say about this matter). Work was reserved as a term for the place and the activity we did at the employment location. For many writers and thinkers, this is still the key conceptualisation held for the term work.

Work became both a place where one went to carry out labour as distinct from home in the common usage and in most economic literature. Workplaces were analysed and social theory and research has been extensively devoted in quite recent years to various interpretations of the impact of work on society and
individuals. Issues surrounding class, gender, power and revolution have all been rooted in the modern and post-modern eras in aspects of or arising from interpretations of the “working condition”.

The emergence of work as a term of greater interest in the last decade is well exemplified from such works as Rifkin’s 1995 popular book The End of Work, in which he writes extensively about the changing face of work in the USA society and the impact of advancing technology revolutions in computing, information, knowledge industries and robotics. Interestingly, in a strange parallel with the rhetoric surrounding the close of the 19th century, there was a spate of “end of” books published in the mid to late 1990s as we approached the new millennium (Postman’s, The End Of Education, 1995; Horgan’s, The End of Science, 1996; and Moore’s, The Death of Competition, 1996). It was almost as if the feared millennium bug was going to lead to some dramatic social ending of many cherished ideas and social institutions.

On a lighter note, we could argue that we know that a term has reached a level of acceptance and popularity in modern society when a popular paperback bestseller can emerge on the topic entitled, Better than Sex: How a whole generation got hooked on work, (Trinca and Fox, 2004).

At the risk of the discussion here slipping into a semantic side track we wish to suggest that much of the language that is centred on the term work, is indicative of a number of meanings being utilised in our society and that accordingly, some consideration of these multiple meanings ought to be included in our debate.

Work, as we use the term can (and has) been applied to a much wider range of aspects of social and personal activity and thinking than we usually take into the discussion when we are considering workplace learning and work-based learning (which we will come to next in this paper).

Work, as a term, can be applied to what we do in the garden on Sunday as we trim the bushes and dig the soil. It can apply to the activity we complete sitting at the computer as we write a conference paper or article like this one. It can apply to the washing up of pots and pans we just completed between the garden work and the computer work. It can apply to the school work our children are completing in the lounge room ready for Monday’s classes (we even have a specific sub category title of “Homework” for this activity). There has been research and theory published on the concept of Academic Work (Tomlinson and Walberg, 1986) and we have University degrees in areas such as Social Work. Work, now can mean many different things.

For the purposes of this paper we consider work to be a more generalised notion than employment or an activity that takes place in a site that involves production for remuneration.

We see work more as an enabled purposive effort by an individual to initiate activity or respond to an issue or problem in a range of situations for some productive end. This emphasises that the action is intentional engagement.

Work is then about an active intentional engaged process, not a site, a job or a specific activity only completed in an enterprise setting where the focus is on remuneration for labour.

This conceptualisation broadens the potential for us to explore Workplaces and eventually Learning in, at, through, or about work as a very different event from what has been the tradition in this field.

Workplace Learning

There have been a number of recent discussion papers which have examined a range of issues surrounding the emerging “field” of workplace and work-based learning.

In their paper presented at AERA in San Diego, 1998, Malloch, Cairns and Hase sign posted their interest in exploring workplace learning ‘Workplace learning, whilst pragmatically effective, may potentially lead to procedural learning, therefore detailed analysis of what lies behind needs to be a focal point.’ P.23. This 2005 article is a return to that mission, albeit a little late! Education and training over the past two decades has particularly emphasised workplace, work – based learning, with the place for that learning appearing to emerge as of paramount importance rather than the learning.

The concept of place in learning with humans has been a consideration from the time of Aristotle at least. The notion has also fascinated the eastern philosophers such as the influential Japanese writer Nishida (1987a, 1987b). Nishida’s concept of Ba and Basho have been influential in recent years in considerations of Knowledge creation in organizations (Nonaka and Takeuchi, 1995; Von Krogh, Nonaka and Nishiguchi, 2000). Ba refers to the Japanese understanding of Place as a “shared mental place for emerging relationships” (Nonaka, Reinmoeller and Senoo, 2000). This can mean a physical, a mental or we would suggest in today’s sphere, a virtual place where one learns. In the case of a consideration of workplaces as learning sites in the broad sense there would be many different Ba’s that learners move among and interact.
within. In addition, there are many other Ba that all people move among.

Basho, refers more to the spiritual levels of place than Ba, with three different levels of what is termed “universal Basho”. As Scharmer (2000) has described this concept, the three bashos are analogous to three forms and epistemologies of knowledge. The first level of Basho relates to explicit knowledge. The second to tacit-embodied knowledge and the highest level (that Nishida called “intelligible universal or nothingness”) is analogous to self-transcending knowledge.

Elsewhere one of us has described in detail a model for considering adult learner managed learning in terms of PAM (Place, Agency and Mindfulness) (Cairns, 2003), with a major argument that adult learners (we could read “workers” or all adults people here) operate in a range of Places where they learn (in the psychological sense of a place) be it possibly a Zone of Proximal Development (although Cairns argues that for adults this concept needs some different thinking with regard to the usefulness of “more capable others” as scaffolders), Ba or the three Bashos. This brief discussion does not do justices to the complexity of the issue of place in the theoretical consideration of workplace learning and the issues surrounding the understanding of workplaces per se, but is included to raise the points that any assumptions about workplaces as non contestable sites of employment is a simplistic way to proceed.

As just outlined in the previous section of this paper, most writing on workplace and work-based learning appears to assume that workplaces are places of employment and are remarkable dissimilar from homes and other non-workplaces. This dichotomy between workplaces and non-workplaces is both pervasive, and we argue here, not necessary nor sufficient in a consideration of workplace learning.

This argument is not intended to simplistically assert that all situations and life experience sites are workplaces, but rather to argue that places of employment are not the only workplaces we move around, within and work within (taking work as defined above).

Much of the discussion about Place, in Learning centres on either institutional sites such as schools, Universities and other “formal” learning establishments as legitimate situations or contexts. Often, workplaces (in the traditional employment sense) are seen as “informal” learning sites and are thus invested with some lesser status as effective learning venues.

Some writers have taken the various dichotomies represented within the Figure 1 map as being inappropriate descriptors within the literature on workplace learning. Bilet (2001), for example, has critiqued the artificial dichotomy which has predominantly been seen in the writings of the area where “informal” (ie workplace learning) and “formal” (ie institutional based such as College or University) learning have been contrasted. Implicit in much of this discussion in the past has been the assumption that informal learning is somehow less important than formal learning (and Bilet rightly is harsh on this aspect).

We would argue that both formal and informal settings for learning experiences have, more recently, come to the necessary consideration of the nature and types of pedagogical explorations and applications the traditional University and traditional workplace have had to deal with. There is a gradual dawning awareness in Universities in the UK and Australia in recent years that there are emerging differences in the way they need to work with work and places of employment and that the previous “great divide” is closing rapidly.

Lave and Wenger (1991), in their influential work on situated learning and legitimate peripheral participation appear to have assumed that workplaces are a matter of where productive work is carried out by the masters (eg master tailors) with experience and expertise in their community, whilst the learners or apprentices will learn by peripheral legitimate participation and eventually will be inducted into the community of practice. We suggest that this view, whilst influential in the last decade, is based on a quite static view of the workplace and the behaviour and learning therein.

As Tennant (1999) has outlined, Lave and Wenger clearly placed their theoretical case in a polarised position way from the psychology of the individual learner to emphasis the social nature of work learning in particular.

Their conception of learning entails quite a different mindset: away from the individual and towards the community. They are keen to distance themselves from the individualised psychological tradition which emphasises learning by doing, reflection, and a decentring from the teacher to the learner, emphasising the view that learning is an “integral and inseparable aspect of social practice” (p.173-4).

While Tennant’s comment here is out of context, the essence of this interpretation of Lave and Wenger’s works and impact is, we would argue, fairly typical of many of the writings in our field, where Lave and Wenger’s work is said to have de-emphasised the individual learner and his/her inner processes and situated the learning in the social group or “community of practice”. Whether this is an accurate interpretation
and representation of Lave and Wenger’s ideas in the Workplace learning field is not the issue we are pointing to, what is the issue is that this projection and its consequential emphasis on the social situativity of all learning became quite rapidly the genre and de-emphasised, what for us is the essential player in the workplace learning arena, the **learner**.

While the general notion of communities of practice and legitimate peripheral apprenticeship learning can be seen to have given rise to a number of useful discussion points and to offer some explanatory modelling of how some experiential learning in society seems to be handed on from one generation to another, it does not easily offer support for the explanation of innovative processes and experimental processes of learning (how are new recipes for new cakes generated?) There is an air of “closed community” learning implicit in the model and the notion of legitimate peripheral participation in an apprenticeship sense seems to lessen the learning that the “master” may experience in the interaction, due to the emphasis on the apprentice being inducted into the ways of the community. There are positive aspects of the broader communities of learning ideology that has arisen as a sub-field of learning in the organisational sense and this concept, it is acknowledged, provides a basis for groups providing support and sustenance for a wide range of learning opportunity. It is the situation specificity of the learning of some workplace elements, for example Stevenson’s (2002) study of motel “front of house” work which he claims shows that “the ability to engage in effective practice in these studies was site-specific” (p13), that appears to us to be taking the case against any generic aspects in workplaces too far in the name of applying the situated learning lens.

The issues of generic versus situation specific skills and attributes in the workplace and the questions surrounding transfer has featured in an entire issue of the *International Journal of Educational Research* (Vol 37, 2002), and the research base for these articles was the Stevenson motel study conducted in Australia and the conclusion reached was that

> **The findings of the studies reported in the various chapters in this volume suggest that ideas of transfer as the direct application of generic procedural and declarative knowledge from a prior learning experience to a new situation are too simplistic (p.13)**

The issue of what, if any, generic skills and attributes may be transferable from one site/work experience to another is important given that there has been a move away from job-specific competency training to more essential generic capability in the literature in the past decade (Cairns, 1997; Stephenson and Yorke, 1998). If, as is suggested by those who have adopted a situation or workplace-specific lens to study skills and attributes, there are few generic of transferable elements in various work practices, then much of education and training is in need of a serious replanning.

A good deal of current school curriculum reform in the aforementioned Lifewide influenced ideology whereby broader “essential learnings” such as problem solving, are being suggested, flies in the face of the situation specific push. Even, we could argue, our popular television series in the USA and elsewhere seem to have been pushing the generic ideology as is evidenced by Law and Order (Everywhere) and *CSI (Everywhere)* as well, in Australia, we have had a plethora of lifestyle programs and the misnamed *Reality* shows, all of which assume that there is some generalisable appeal for a genre of program.

Our own research, and that of our close colleagues in similar projects, which grew from and was inspired by some of the original Lave and Wenger peripheral practice thinking (Cairns and Stephenson, 2001), showed quite clearly that a good deal of the learning and the learning milieu were more a “spill over” effect of learning engagement by the workplace assessors who were verifying the learning of the “trainees” than the learning effected by those being trained (Williams, Cunningham, and Stephenson, 1997; Stephenson, Williams, Cairns, and Critten, 2000). The assumed “masters” were actually engaging more in the learning than the trainees, but at a different level of abstraction and understanding.

> **Theories of workplace learning, or the discussion of them have been couched in terms that have assumed that the place where work is carried out in the employment sense, as mentioned above, is what workplace learning is trying to describe. Theorists such as Billett (1998) and philosophers of education such as Hager (1998; 1999) have been at the forefront, in Australia, of examining and legitimating the field of workplace learning as an area of study, research and theory.**

Billett (1998) set out in his work “to develop a clearer understanding of workplaces as learning environments” (p.47), and presents a well argued position, though we would suggest that he still sees workplaces as employment sites where legitimate learning occurs rather than embrace a broader model where all places are learning places and work is not restricted to employment sites as we are suggesting in this paper. Billett’s 2004 paper has progressed and his argument there for due consideration to what he terms “affordances” and “constraints” of the social setting in tandem with individual agency would have us much more in tune. He still seems to be pushing the issue however, that learning is not restricted to “formal” settings such as in institutions and that the “informal” learning (ie at workplaces), “formal” learning dichotomy is not appropriate. This latter point seems to
us an issue that has been put to bed earlier in the international debate and we should move on. Perhaps we are wrong on this aspect?

Hager (1998) has argued that while many writers have mentioned “workplace learning” or terms close to that expression, they have approached the theorising about this “typical interdisciplinary topic” from many different perspectives. He presents the case that while in 1998 there was “no theory of workplace learning that has gained overall majority support” there were various acceptable principles as to what workplace learning was. Hager went on to examine a number of promising models and theories and compare them within an analysis framework which led him to the interesting conclusion that there was a difference among the theories about the possible purpose of workplace learning. “Is learning for work or work for learning, what should be the central focus?” (p42).

Karen Evans (2002 and 2003) has also written about the definitional issues under the book titles, Learning to work and Learning for a living.

Boud, (1998) and Boud and Garrick (1999) have devoted a number of volumes to exploring a wider range of aspects of “workplace learning” and “learning at work” where there have been extensive discussions of the changing contexts of work and ways to understand and theorise work and learning in the workplace.

Engestrom and Middleton (1996), in a work that is partially in concert with our current view, argued that work was a “mindful practice”, as they present a series of chapters by authors who are advocating or exploring aspects of their activity theory approach or some closely related to it.

What emerges from any consideration of the emerging large field of writing on Workplace Learning is that since around 1995 there has been considered debate about the meaning of the term and the relevance of various theoretical positions and models. We are left with contradictions and a “disturbance in the force” as Darth Vader might put it. We hope that this paper will assist in dissipating that disturbance rather than accentuating it.

Learning and Work: Together

The consideration of workplace learning and the previous discussions in this paper about the two terms Learning and Work lead us directly into a consideration of a number of aspects and/or issues about the conjunction of these two terms. Specifically, what is it that connects these two concepts and fascinates many of us as practitioners, theorists and researchers? When we learn, in conjunction with work what is the process and what are the intentions?

Do we learn at work?
Do we learn about work?
Do we learn through work?
Do we learn in work?

Or, as our title for this paper implies, Do we learn work?

These questions raise some significant aspects of interpretation about Learning and Work. The first question, “Do we learn at work?” emphasises both the location of the learning and the activity in the senses of the location of the learning in a work environment as well as the potential of the learning to be happening as one works (similar to “men at work”). This raises the issue of whether activity in a “work” sense is what the worker is at.

The second question, “Do we learn about work” also has at least two possible interpretations. One is that whilst engaged in work we are learning how and what the work is and its place and constitution. A second possible interpretation is that workers learn in the social milieu which surrounds the work (about).

The third question, “Do we learn through work?” implies that we learn whilst we work and through the operations we perform at and in carrying out the work,

The fourth question “Do we learn in work?” suggests that we learn whilst in-task at a work site.

These multifaceted meanings are more than semantic gymnastics, we argue. The manifold meanings and possible interpretations lead us to our title, which suggests, we offer, that what is happening in this arena is actually Learning Work. This terminology also, deliberately has two meanings or interpretations. We learn work as a process and the work of learning is a process. Each emphasises the process nature of what the activity entails.

Our argument concerns the apparent need to theorise workplace learning within a broader context of both the terms Learning and Work and to consider the two together in a reciprocal interactive model where the individual’s agency and psychological Place of learning is a key consideration in interaction with others in social settings (be they home, educational institution, employment site or whatever).

This view has emerged from a number of our own research projects and their findings. As we have been pursuing workplace learning and considerations over the past decade we have been struck by elements of what we saw initially as “other aspects” of the data we collected which at first did not seem core to our studies. These concerned the way workers in employment sites frequently drew in other elements of their life and places and spin offs as to the way they thought about
work and learning. This emphasised, for us, that we had been trapped in seeing work-based and workplace learning far too much in isolation from the whole-of-life learning all people are engaged in every day. This idea sparked in us, a concern for the many other dichotomies which seemed to pervade the writing and research in the field and thus influenced the theorisation across the field.

In the 1998 study of Capable Organisations, (Hase, Cairns and Malloch) the workers at one of the case study sites, a chemical processing business, recounted the changes in their approach to learning and work. It was once the case that they ‘left their brains at the gate’ as they put it, but a re-organisation of the company and inclusion of workers in real decision making and leadership had made a huge difference. The management recognised the value of having workers fully engaged in what they were doing: ‘We need them to bring their brains with them because the person who is doing the job has got a far greater capability in coming up with cost – cutting solutions than the person who doesn’t do the job.’ p.29. In addition, the interviewees in this study often gave examples of how their shifts in learning and thinking “at work” had resulted in them doing other things in different contexts (for example, learning Powerpoint at work, not for the company, but for the self enhancement and then presenting at major workplace conferences on their company ideas, for the company as its representative; behaving differently in terms of their previous industrial approach and influencing their union in this direction; encouraging colleagues outside work to have different attitudes to learning “beyond the job”).

In the unpublished study, (2003) Getting the job done: How employers use and value qualifications (NCVER, SA) in which one of us participated, the bakery case study identified approaches to learning which they valued in potential employees, situating the worker both at work and at home as a valuable part of the workplace learning.

‘People coming to work in the industry need to be passionate about the industry, that they need family background and family support… it is important for people to have skills and to be able to adapt… skills of adaptability and being able to relearn even though you have learned things you continue to learn, be flexible and be prepared to change your ways… Pride…Identifying with the product and identifying with the business, connecting with it and that passion of how to do it.’ P.58.

The surfboard maker in the same study, affectionately known as “Wild Bill”, in speaking well of an employee noted ‘someone that wants to learn and wants to be good at what it is (they do) …that’s the kind of attitude …it’s hard to find in those sort of people too and I know a lot of good ones there.’ (p.58).

The differences among respondents to a wide range of interview questions has shown that there are not clear, simple learning answers about learning in the workplace. Just as there is such wide diversity in our societies, so there is a wide diversity of viewpoint on what learning is at work and beyond. Our point is that the interaction, not the separation of, work and learning is the key learning for us in theorising about workplace learning.

Such elements also included continuous improvement ideology as well. For example,

‘What we have to get used to in industry is that learning is a continuous process. I would encourage TAFEs, etc, to have certificates for training competent tradespeople and what are the additional things people need to help their industries, for example, dual qualifications, on a night school basis.’ There is a need to ask ‘what more can I do to add value, keep skills up to date…electronics, computing, people skills are important, but it depends on roles.”

(General Manager) interview, power station (2002) in response to a question as to whether the organisation was seen as a learning organization.

‘I think so, they’ve never stopped anyone learning.’ (Union Representative on Training Committee)

The value of learning off - the - job as a partner in the relationship, not an alternative, was stressed by the IT case study in this research, where it was noted that on the job learning and new technologies to support on line learning will ‘never replace the classroom because it will never replace the time where you remove yourself from work and dedicate yourself for a few days away from the work environment. The (workplace) environment is not the optimum (for learning). It is better to be in the classroom where you can interact and throw around ideas. Humans like to interact!’ (p.51).

Workplaces are thus changing and “workers” are becoming more conscious of themselves as learners (and “mindful” of this change). Organisations are being urged to become more and more Learning Organizations and there has been a noticeable flirtation in Australia by business and industry with Faculties of Education as partners in learning development over Faculties of Business due to an understanding of the pedagogical necessity in any such enterprise and an apparent perception that this is what Education can offer.

Workplace learning is then a changing enterprise and one that theoretically is growing and flexing some
muscles as to its applicability and relevance in the area of learning theories.

In an interesting further insight into where the view that workplace learning is (and we say, should be) a broader conceptualisation than employment site activity related to improved production efforts, we offer a further final consideration of a current research study in progress.

One of the authors is currently supervising a research student’s thesis, which is nearing completion. This thesis is a narrative account of over a decade of “home schooling”, most of which has taken place on a somewhat isolated rural property in Australia. The mother, the researcher, a former teacher in a school environment, has been tracing her long and involved journey through her journals and programs she wrote while educating her daughters, all of whom have some degree of learning difficulties. Our researcher’s journey, unlike many other researchers, is what she has described in her writing up as “upside down” as she did not begin with a research idea and a theoretical literature review, but rather with lived experience and a desire to make sense of it and to write it up for others to see and possible benefit. This work gradually, through many discussions and debates emerged as a clear case of a different workplace learning scenario. The curriculum was life and work at the farm. This thesis will shortly be finished and will take the conceptualisation that work and learning are broader and not limited to employment sites further in a legitimate and thoughtful way.

CONCLUSION

Our paper is, at this stage, more a work in progress like the thesis above, than a definitive final product. We see this as almost emblematic of the conceptualisation we are arguing for as our “case” in this paper. Workplace learning is a fluid process, not a product.

We see the need to re-theorise Work, Learning, Place and Workplace Learning as broader and less employment site specific concepts as essential for us to better understand how the necessary reciprocity of learners learning and social communities of practice interact with different Ba across different levels of Basho.

The importance of the elements of Place, Agency and Mindfulness (PAM) in any model of Workplace learning has been positioned in this paper as central to understandings of human learning in relation to all that we do when we talk of work.

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The NCUE aims to produce a volume of the International Journal of Technology and Engineering Education with as uniform an appearance as possible, and it is therefore requested that you conform to these instructions when preparing your article. These instructions are following APA style.

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2. PAPER SIZE
   The length for papers is about eight to ten (8-10) pages, arranged on white paper, A4 size (210x297mm).

3. TYPEFACE AND LINESPACING
   Those with laser printers should select a Times New Roman font of 10-pt size on 12-pt line spacing (6 lines per inch). Papers must be justified, with the text in single-line spacing, and in the line spacing between paragraphs. Do not indent paragraphs. In preparing your paper you may use the Word style file on the attached disk, designed for an IBM or compatible computer. When keying in your paper use the page-layout view option to get a better view of the page layout. When transferring the file of your paper to the supplied style file on the disk, the computer may change the page layout settings. The correct page layout settings are as follows:

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4. TITLE, AUTHOR AND ABSTRACT (please following APA style)
   The title should be in the style as indicated in the sample (only capitalize the first letter of proper names). Author(s), affiliation(s), city and country should use first capital letter and lower case. Do not abbreviate the affiliation.

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International Journal of Technology and Engineering Education

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IV. *International Journal of Technology Engineering Education* will send the reviewers’ comment to the papers’ authors and express accept, revise or reject paper.

V. The process of paper evaluation as following:

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* If two reviewers opinions are too much difference (up to 15 points), the paper will be evaluated by third reviewer.

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