

*Towards a Conceptual Model for Online Group Work –
Addressing Graduate Skills Development in Online
Courses.*

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Abstract

In moving towards what Lemke (1996) terms the 'interactive learning paradigm', higher education has adopted group learning technologies as both the means and ends by which graduate attributes and group skills are evidenced and developed. In this light, learning is mediated by (and occurs through) language (Falk 1997; Gee 1997), and is distributed across a managed (but growing) range of people, sites, objects, technologies and time (Gee 1997). This paper details a more recent principle that has emerged in the form of flexible (anywhere, anyplace, anytime) learning that seems to fly in the face of accepted views of group learning technologies. Many universities now choose to offer 'learning resources' flexibly online. This paper describes the distribution architecture that enables this to happen, the discourses that drive it, and the limitations that plague it. In short, the paper examines whether Information and Communication Technologies (ICTs) are 'robust' enough to support, sustain and address industry, employer and government calls for greater attention to group skills development in university graduates.

Data features an examination of respondent feedback (n=171) in an 'online' group work setting, and their subsequent ratings of group skills development over a 13 week period. This discussion offers an account of learner outcomes by adopting Kirkpatrick's (1996) four levels of evaluation of learning as a classification scheme for determining learner satisfaction (Level One), the effectiveness of group skills learning transfer (Level Two), its impact on team practices (Level Three) and the appropriation of learning behaviours by group participants (Level Four). Data points to the need for an interactive model of group skills development that focuses on "the demands of the new world environment" (Blasi & Heinecke, 2000, p5), and that is capable of recognising new social presence and the production of social categories online.

The New Paradigm of Flexible Learning – A New Group Skills Architecture

The term ‘flexible learning’ is often used to describe teaching and learning developments in Australian higher education (HE) institutions. It is not a well understood concept, despite its common use. We know it doesn’t literally mean e-learning, nor is it directly synonymous with online and/or distance learning. It may be problem or practitioner-based, self-paced, situated or collaborative; it may or may not involve the use of information and communication technologies; it can be short-term, but equally will be part of a lifelong cycle of learning. In a ‘pun’ made famous by Ray Land of Edinburgh University, the handle of ‘flexible learning’ allows Australian universities to ‘blend it like Beckham’ in making *pragmatic* choices about the face-2-face and online ingredients they choose for the makeup of their own particular educational product mix. This has been a productive pluralism, giving rise to many entrepreneurial, different and varied HE institutional forms and educational products. It is also an unproductive pluralism; each small step forward for a single institution, has not always constituted a huge leap for the HE sector, and its graduates. All Australian HE institutions employ the use of a Managed Learning Environment (MLE), Virtual Learning Environment (VLE) and e-learning portals as part of their institutional strategy. The drivers for adoption are local, regional, national and international, and include:

1. Widening access and inclusion for diverse learners in higher education;
2. Enhancing employability and graduate skills development;
3. Providing flexibility for full-time students in a part-time employment world;
4. Meeting government demands on quality and accountability;
5. Complying with government policy on workplace reform and university funding;
6. The globalization of the HE sector and the emergence of new competitors;
7. The creation of new learning partnerships; and
8. The development of new markets and new educational products.

It is the second of these drivers, the enhancement of graduate employability and skills development that is at the heart of this paper. Given what we now know about the burgeoning global higher education market, there is a common sense understanding about the motives of sector-wide moves (1-8 above) towards MLEs, yet some confusion still surrounds the definition, functions and role of MLEs, VLEs and e-learning portals, and how each works as a structuring resource in delivering these outcomes (1-8 above). The definitional work that follows lists the status of current understandings.

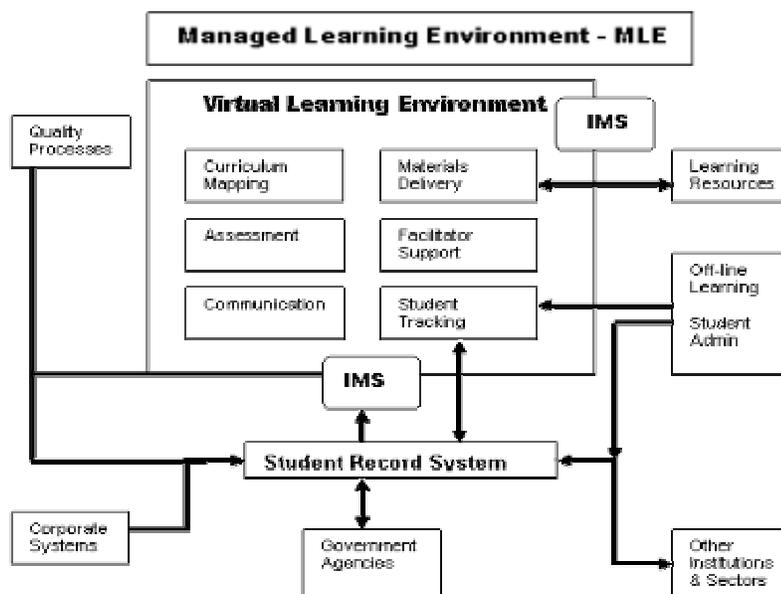


Figure 1: The Integrated MLE

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The MLE: The frameworks offered here hail from the precinct of higher education (JISC 2003, p.13) and define the MLE as “*the whole range of information systems and processes of a college or university (including its VLE if it has one) that contribute directly, or indirectly, to learning and the management of that learning*”. Based on her survey of 481 HE institutions in the United States, King (2002) is quite specific about just what the MLE ought to comprise; an institution that has purchased one or more proprietary student, finance, or human resource information systems can be said to be embarking on implementation of a MLE.

The VLE: The VLE is one component of the MLE, and is perhaps outside of the United Kingdom more commonly referred to as a Learning Management System (LMS), or what King (2002) in her united States study calls the proprietary ‘student’ system. The Australian VLE market leaders are WebCT® and Blackboard® (McKnight, Halford, Coldwell, Corbitt, Mulready & Smissen, 2002) although the precise strength of market leadership varies from survey to survey (see Bell, Bush, Nicholson, O'Brien, & Tran, 2002). Several institutions have multiple systems in use in different faculties/schools, but support only one VLE system centrally. This lends some need for ‘caution’ in trying to interpret levels or degrees of market dominance, as the sum of the parts do not necessarily equal the whole. The main client relationship featured in this kind of VLE is that of learner, and learning provider, with a clear emphasis placed on core learning functions built around:

- Controlled access to curriculum that has been ‘chunked’ for discrete assessment and reporting.
- Tracking student activity and achievement against this curriculum through simple administration tools.
- A structured (learning) resource base and facilitated assessment suite.
- Communication between the learner, provider and learning technicians to support learner feedback.
- Group communication suites to support collaborative learning, and;
- Links to parallel administrative systems, both in-house and external (JISC 2003, ps. 85–98).

The Portal: The institutional ‘portal’ is an enterprise level expression of IT systems and services, through which access to all component systems and services is provided. Traditionally a feature of large commercial organizations, the ‘portal’ will customize the institution’s homepage for users, based on user characteristics. Sub-user groups, typically staff and students, are given access through a defined interface, which should exhibit the fundamental portal characteristics of:

- Built-in infrastructure and security related features (single sign-on authentication and authorization to the portal and its component parts as separate subsystems);
- Access to enterprise-wide information and services (directories, aliases, calendars & news updates);
- Group-level customization to discriminate separate services/information to defined sub-groups;
- Information ‘push’ channels that form part of the sub-group customization; and;
- Individual customization facilities to support the sub-level customization efforts of users.

These enterprise system components are designed to capture and bracket institutional relations; the MLE is the organizational shell; the VLE the learning shell, and the portal links and labels communities of users in meaningful (structured) ways. It is to the VLE, and the issue of graduate skills development that we wish to digress.

Group Skills Development in an Era of Flexible Learning

Much has been written about the growing emphasis on ‘generic graduate skills’ in Australian higher education. One driver is the increasing evidence of demand from business and employer organisations for graduates to possess a set of generic employability skills (B-HERT, 2002). There is also a subset of economic, technological and educational arguments that have brought generic skills to wider attention, indicating that the generic skills agenda is really part of a bigger, and as yet unresolved debate about the vocational purpose of university education and the ‘employability gap’ for some graduates. When asked about desirable graduate attributes, industry is quick to respond with assertions of the need for graduate employees to ‘work cooperatively’ (B-HERT 2002; Bormann-Young & Henquinet, 2000; Kolb, 1984). The rationale for ‘cooperative interaction’ is simple: as organisations continue to decentralise decision-making and to deal with today’s complex and changing environment, there is a greater reliance on workplace teams to ‘carry the load’ (Falk, 1997).

Johnson and Johnson (1997) refer to the importance of ‘cooperative interaction’ as a condition for demonstrating graduate skills ‘in context’. However, working together (like any other graduate skill) needs to be developed and learned. Understanding small group formation, its dynamics, processes and outputs are foundational elements in the provision of effective learning environments. Though few university courses focus on ‘working collaboratively’, the use of groups as a learning technology is common to many university subjects for obvious reasons. For the benefits of efficiency and productivity, groups accomplish tasks that can not be done by individuals alone; they bring multiple perspectives to bear on a single problem; they capture the dynamic of real world complexity; they provide a vehicle for decision-making and taking, and they impose an efficient means of organisational control over individual behaviours (Harrison, 1999). For socialisation purposes, groups form a key element in the broader educational process. They are instrumental in the formation of personality; are agents of both socialisation and control, and act as a motivational tool within a continuous cycle of learning.

In order to link educational and workplace experiences at university, the use of group work has mapped onto wider debates about more institutional notions of ‘learning’. Learning has become a key interface for processing the acceptance of new values through change processes (Mezirow, 1991). In higher education this is captured in a range of terms designed to convey the dynamic of the new learning agendas: ‘action-learning’, ‘collaborative learning’, ‘lifelong learning’, ‘self-paced learning’, ‘situated learning’, ‘distributed learning’, ‘flexible learning’ and more recently ‘practitioner-based learning’. In moving towards what Lemke (1996) terms the ‘interactive learning paradigm’, higher education has adopted two key principles consistent with group learning technologies:

- Learning is always mediated by and occurs through language (Falk 1997; Gee 1997), and;
- Learning is distributed across a range of other people, sites, objects, technologies and time (Gee 1997).

A third and relatively recent principle to emerge on the higher education scene that seems to ‘contradict’ accepted views of group learning technologies is that:

- Many universities now choose to offer ‘learning resources’ online.

What do we know about Group Skills Development in Higher Education

Group work has been widely adopted by Australian academics to facilitate acquisition of industry relevant ‘team’ skills in student learners. Bormann-Young and Henquinet (2000, p56) define group work as “an assignment that requires two or more individuals, interacting and interdependent, (that) come together to achieve specific objectives”. Given the broad parameters of this definition, group activity is not confined to a single product or common grade for members, and may vary from (and include) information sharing to collective performance of a common product. Accountability processes can also vary from individual to joint arrangements, and the separation of task and process possible to the extent that ‘learning’ may be shared, but ‘effort’ and ‘output’ assessed individually. Clearly, group work as currently implemented has all the characteristics and randomness of actual workplace groups. Bormann-Young and Henquinet (2000) propose three ‘generalised’ purposes for utilising group work:

1. **Group Work that is Workplace Centred** – Accenting continuous environmental turbulence where knowledge is the primary source of learning exchange. These processes reflect the reality that learning is multi-dimensional, that knowledge boundaries are ‘fuzzy’, and that decision-making is characterised by reduced system time frames.
2. **Group Work that is Student Centred** – Social learning theories accentuate the benefits of multiple perspectives and feature ‘the group’ as a social support system. This includes aspects of group dynamics, action learning, team performance and participative decision-making (Tuckman & Jensen 1977; Belbin 1981; Dick 1986; Hopson & Scally 1982).
3. **Group Work that is Facilitator Centred** – From a pragmatic viewpoint, group work enables the institution to devise learning structures and processes (commonly the tutorial group) that manage the distribution of teaching across increasing numbers and locations of students.

Given these clear and accepted contexts of use, it still remains that group work has long suffered as a result of inadequate epistemology, and that principles of ‘good practice’ need to be identified and adhered if effective group learning outcomes (read graduate skills development) are to be realised.

These same principles of engagement become much more complex when transposed onto a flexible learning setting. Given the limitations of ICTs as low presence and low cue media, and the distributed nature of relations in a networked ICT environment, the task of managing the critical factors in group work (in ways that inform graduate skills development) becomes much more difficult. Will group skills development 'fit' the ICT mode of learning; how will 'broad-based' evaluation be conducted; how will 'instructional issues' differentiate between 'group product' and 'group process' issues; and how will the ICT platform impact on the individual 'efficacy' of group members?

Defining the problem – the limitations of ICTs

Social presence theory (Short, Williams & Christie, 1976) has marked the online, computer-mediated or ICT (information and communication technology) rich world as largely impersonal. This assertion is based on the belief that different media convey different degrees of perceived substance to an interaction, with the quality of connection based on the amount of nonverbal communication made available to the receiver in a given exchange. As a low presence, and low cue media, social presence theory suggests that the ICT environment will be 'stretched' in its attempts to facilitate the 'cooperative interaction' of students in a group work setting. Sproull and Kiesler (1986) extend this contention to include social context cues, which serve as indicators of appropriate 'contextualised' behaviour. Social context cues in a face to face setting govern the norms and practices of contact, social desirability, conversational turn taking, standards of disclosure, and a host of situational and context variables. However, social context cues are embedded in nonverbal communications. Given the absence of nonverbal cues in an ICT setting, it follows that where ICTs are involved we are less able to make subtle differentiations among communication stimuli, and therefore less able to exert control over our selves in order to meet group expectations and to perform important group roles. As Sproull and Kiesler (1986) contend, this is more likely to lead to role-ambiguity, increased anonymity, reduced self-regulation, and reduced self-awareness. This is hardly the kind of credentialism universities are seeking to develop in the new-aged graduate; a worst case scenario could see ICTs as counterproductive to the development of generic graduate skills.

Despite these limitations, ICTs are now uniformly and seamlessly integrated into contemporary curricula in higher education in the form of distributed learning management systems (MLEs) and embedded 'learning objects'. ICTs have effectively become an organising frame in the rhythm of contemporary educational discourse, but often in a context "where information technology rather than 'pedagogy' drives curriculum reform" (Celsi & Wolfenbarger 2001, 308). At risk in these new learning environments is the 'fabric' of critical education, as students move away from active learner participation to browse through a 'stockpile' of just-in-time information made available online (Blasi & Heinecke 2000, 83). On top of this, as Lambier (2002, 113) puts it, ICTs seem to "feed of the limitations teachers often have to face" in the process of teaching. The emphases placed on time management, class management and efficiency, individualisation and autonomy, information processing and problem solving in an ICT rich environment promote a pedagogy that understates the value of collaborative learning processes and relations at a time where industry calls for greater attention to group skills development. This paper questions whether ICT mediated group work is robust enough as a technology to meet the challenge of the 'generic skills' agenda? Will ICTs be able to support, sustain and address industry, employer and government calls for greater attention to group skills development?

Group Skills Development in an Online Setting.

Group work can break down for a variety of reasons, many of which relate directly to student group skill processes. As a socialising agent, face-to-face group work engages students at a range of levels in learning about groups. As an immersion strategy, face-to-face group work presents frequent authentic opportunities for learning about the self, for exploring new and different relationships, managing feelings of risk, developing assertiveness, facilitating group processes and performing situated group roles. Yet, to what degree are these feedback and performance processes part of an ICT group work setting, with its lower relative levels of social presence and less social context cues?

This question underpins the following examination.

- ◆ It features 171 respondents who had taken part in an online group work task, and cites their subsequent ratings of their group skills development over a 13 week period.
- ◆ The form of group work featured replicates 'industry-style' team structures spanning the host Business School and its local industry partners, with a focus on professional skills development.

- ◆ The setting is a final year business subject, which integrated aspects of group dynamics, action learning, team performance and participative decision-making (Tuckman & Jensen, 1977; Belbin, 1981; Dick, 1986; Hopson & Scally, 1982).
- ◆ Specifically, students were asked to form ‘virtual’ workgroups, identify a relevant industry project, and collaboratively (with industry partners and academic supervisors) scope and design a response to each identified problem.
- ◆ Industry partners also contributed to the assessment of the student groups, and were invited to comment on student professional readiness as part of this data set.

This discussion offers an account of learner outcomes by adopting Kirkpatrick’s (1996) four levels of evaluation of learning as a classification scheme for determining learner satisfaction with group skills development (Level One), the effectiveness of learning transfer (Level Two), its impact on ‘team’ practice (Level Three) and the appropriation of learning behaviours by participants (Level Four). The andragogy that drove the design of the host subject is arguably the kind of andragogy that underpins many of the ‘better’ current practices in teaching, learning and assessment in higher education (Ausubel, Novak, & Hanesian 1978; Knowles 1984; Boud 1988; Laurillard 1993). In short, these theories focus on processes of learning where the development of critical generic skills is treated with at least as much importance as content knowledge.

A New Conceptual Model for Online Group Work.

In an ICT-rich group work setting, one key difference is that group work is mediated by technology, task and role performance. As the learner moves through ICT enhanced group work, the assumption is that they do so in a way that brings them closer to definitive aspects of situated group practice. This means that ICT-rich group work needs to engage members in concrete group learning activities that incorporate reflective processes that enable each party to engage other members (future, potential, prospective employers, and prospective clients) about professional competencies that have consequences beyond their immediate teaching and learning boundaries.

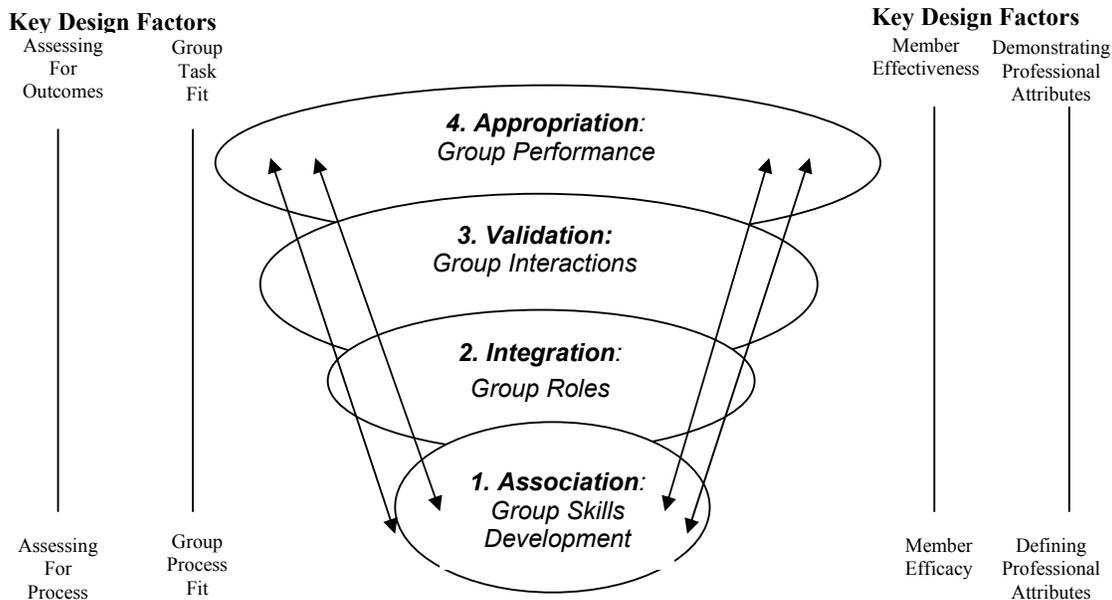


Figure 2: Community Learning Model (Baskin, Barker & Woods, 2004)

In an ICT-rich setting, group skills develop when a group member determines connections and makes relevant associations between the ideas and feelings related to managing group work experiences. The acquisition of ‘group skills’ in an online setting is a gradual process, reflected in the progressive steps of association, integration, validation and appropriation (Figure 2 above). At each step in the acquisition process, the learner moves from the more ‘subjective’ level of ‘associating’ group skills practice with existing textbook and theoretical models, towards the more elaborated practices of ‘integrating’, ‘validating’ and then ‘appropriating’ group skills in their semester length group project.

This complexity is represented in a shift from smaller to larger bubbles (Figure 2) with the ‘learner’ eventually immersed in a group project with their host business, and actively ‘appropriating’ group development skills *in situ*. Akin to what Mezirow (1991) terms transformative learning, the association (step 1) of positive group behaviours with group process skills is mediated by emerging member efficacy, group fit, member identification of relevant professional attributes, and member engagement with group skill sets through assessment. The integration (step 2) of new group skills sets vis-à-vis new group roles opens avenues for the student to ‘validate group skills’ through the uptake of new (and varied) group interactions (step 3), drawing the learner through the ‘double-loop’ (Argyris 1992) of learning that leads to membership uptake, and greater member efficacy.

The learning facilitators (academic and industry-partners) are progressively able to interrogate the skills and knowledge development of each group member by implementing assessment strategies that begin where the member is located – initially at an entry level where the member is building efficacy, group fit, and defining professional attributes, and later, where the member is fully performing group tasks. As group skills development occurs, low member efficacy gives way to group skills competencies; professional attributes are consolidated; group fit is fore grounded, and Hargrove’s (1998) ‘triple-loop learning’ (paradigm-shifting) is evident in member appropriation of new group skills sets (step 4). The degree to which the online environment is able to facilitate these group work dynamics is the focus of the next level of discussion.

Level One Evaluation – Perceptions of Online Group Work

Group members (n=171) were asked to respond to a range of statements targeting (amongst other variables) their understanding of their ICT-enhanced learning process, and their perception of the identified modes of learning and assessment in the host subject. Responses were rated on a five-point scale (1 = strongly agree to 5 = strongly disagree). Results (Table 1 below) reflect a generally positive endorsement of each student’s perceived level of satisfaction with ICT-enhanced group work and of the assessment practices applied in the host subject.

Item	Mean	SD
1. I am able to learn effectively in this subject	1.85	.85
2. I believe this subject offered a valid way of learning	2.10	.92
3. I am confident in the assessment processes applied	2.30	1.05
4. Peer assessment is an equitable form of grading	2.30	1.00
5. My grades reflect my efforts in this subject	2.30	1.05
6. Collaborative groups enhanced my learning	2.50	1.08

Table 1: Student Responses to on Learning & Assessment Processes (n=171)

Level One evaluation of this kind is purely and simply a measure of 'end user satisfaction' (Kirkpatrick 1996) and is not to be taken as a measure of the 'quality' of each group members’ personal experience. The results do indicate stronger relative satisfaction weightings by students for the individual learning events (items 1 & 2) as compared to collaborative learning events (items 4 – 6). Again, this preference is not to be confused with the ‘quality’ of the group skills learning outcomes.

Level Two Evaluation – Online Group Work Learning Outcomes

A Level Two evaluation tests participant learning (Kirkpatrick 1996), and generally takes the shape of an evaluation of 'what was learned'. In this case 136 valid (complete) responses to an evaluation questionnaire (Hogan 1999) were returned from the same student cohort (n=171). These were analysed to capture and bracket student accounts of group learning in an online environment. A summary of results for individual learning outcomes (Table 2) and group learning outcomes (Table 3) are presented.

The tabled satisfaction ratings (Table 2) indicate that students endorse ICT enhanced group work as an appropriate forum for learning about group skills development and for collaborative peer-assessment. At the level of individual learning outcomes, participants report a high level of acceptance of responsibility for self-directed learning (89.8%), and of the need for active self-management (80.9%) in ICT mediated group work. That these outcomes are reached in an environment framed by ‘low social presence’ and ‘low social context cues’ suggests that both ‘social presence’ and ‘social context’ factors can be accommodated in an ICT-rich setting. Association factors were high; the vast majority of students reported being able to relate ‘group behaviour theories to a real world’ albeit ICT setting

(78.7%). They also reported positively on their learning about ‘group dynamics’ (82.4%) and in using ICT communication suites to manage the challenge of collaborative learning (75.7%). Integration factors also were high, with most students reporting concrete experience in ‘planning’ (78%), ‘time management’ (78%), in the giving and receiving feedback (68.4%), in having made ‘new friends’ (79.5%), and in having ‘learnt something about themselves’ (60.3%) through the process of ICT mediated group work. At the association and integration stages, learners are seen to be developing a stronger sense of efficacy in their group skills, and are building scaffolds to identifiable professional skill sets through group work practices.

Individual Learning Perspective	Agree		Disagree		Unsure/DK	
	No.	(%)	No.	(%)	No.	(%)
Learnt more about myself	82	[60.3]	21	[15.4]	33	[24.3]
Learnt to manage myself	110	[80.9]	13	[9.6]	13	[9.6]
Made new friends	108	[79.5]	15	[11.1]	13	[9.6]
Learnt more about old friends	59	[43.4]	26	[26.4]	41	[30.1]
I had fun	88	[64.7]	22	[16.2]	26	[19.1]
Felt at risk at first	59	[43.4]	45	[33.1]	30	[22.1]
Learnt to speak up in a group	75	[55.1]	30	[22.1]	30	[22.1]
Can remember experiential exercises more easily	60	[44.1]	15	[11.0]	60	[44.1]
Learnt to further develop trust in other students	82	[60.3]	21	[15.5]	31	[22.8]
I took responsibility for my own learning	122	[89.8]	6	[4.4]	8	[5.9]
Relate group behaviour theories to real world	107	[78.7]	14	[10.3]	15	[11.0]
I felt qualified to give feedback	93	[68.4]	22	[16.1]	21	[15.4]
I felt the feedback I received was adequate	93	[68.4]	18	[13.3]	24	[17.6]
I Learnt to be task orientated	102	[75.0]	8	[5.8]	26	[19.1]
Gave me experience in planning	106	[78.0]	10	[7.3]	20	[14.7]
Gave me experience in time management	106	[78.0]	10	[7.3]	20	[14.7]
Unorthodox/unusual way of learning	71	[52.2]	33	[24.2]	31	[22.8]

Table 2: Individual Learner Perspectives - online group work.

Positive feedback on the group learning perspective (Table 3) reflect patterns of member participation that indicate increased awareness of how ‘my behaviour effects others’ (64.7%), experience with hands on conflict management (55.9%), managing online toolsets to include ‘quiet’ people (68.4%), and in dealing with dominant personalities online (62.5%). Through group work interactions, the vast majority (75.7%) of students report having validated and appropriated new ‘group work’ skills to improve their group facilitation processes. In an environment marked by ‘lower social presence’, students still report exposure to different personalities (86%) and to ‘people they wouldn’t normally be exposed to (71.3%), including those of different culture (57.3%), and different age groupings (77.9%). The fact that the majority of students report ‘social context cues’ as significant in an ICT setting, confirms that ICT learning environments need not be context insensitive.

Group Learning Perspective	Agree		Disagree		Unsure/DK	
	No.	(%)	No.	(%)	No.	(%)
Learnt about people I wouldn’t normally be exposed to	97	[71.3]	12	[8.8]	27	[19.9]
Learnt to facilitate a group	103	[75.7]	15	[11.05]	18	[13.2]
Learnt about group behaviour	112	[82.4]	7	[5.2]	17	[12.5]
Mixed with students from different cultures	78	[57.3]	36	[26.4]	22	[16.2]
Showed up immature students	50	[36.8]	26	[26.4]	49	[36.0]
Watched power struggles	58	[42.7]	33	[31.6]	35	[25.7]
Saw how my behaviour affects others	88	[64.7]	16	[11.7]	31	[22.8]
Mixed with students of different age groups	106	[77.9]	13	[9.6]	16	[11.8]
Confront people exhibiting dysfunctional behaviour	34	[25.0]	52	[38.2]	50	[36.8]
Chance to observe different personalities	117	[86.0]	7	[5.2]	12	[8.8]
Gave me experience in conflict	76	[55.9]	25	[18.4]	34	[25.0]
Deal with people with dominating personalities	85	[62.5]	26	[19.1]	25	[18.4]
Others took responsibility for their own learning	96	[70.6]	13	[9.5]	27	[19.9]
Learnt to include quiet people	93	[68.4]	12	[8.8]	30	[22.1]
Learnt to manage ourselves	93	[68.4]	18	[13.3]	25	[18.4]

Table 3: Group perspectives - On-line Group Work

Results (Tables 2 &3) tend to suggest that ICT mediated group work is able to situate students within contemporary organisational learning processes. In achieving this outcome, the ICT environment also enhances curriculum planning, by providing an effective frame for the teaching and assessing group development theories (Tuckman & Jensen 1977), team-role models (Belbin 1981), conflict resolution skills (Dick 1986) and the dynamic processing of feedback (Hopson & Scally 1982).

Level Three Evaluations: Validating Group Learning Behaviours

Level three evaluation functions as a check to see if the group skills base underlying the curriculum is being accessed and used by students (Kirkpatrick 1996). Mezirow (1991) coined the term transformative learning to capture learning that is based on reflection and on the experiences, ideas, and assumptions gained through prior learning. This type of learning is illustrated in the community-learning model (Figure 2), which is heavily constructivist and already established as a major feature of this study. Participants generally reported high levels of engagement with group processes, theories and models. That associations of this kind gave way to the integration of new online group work practices is evidence of what Argyris (1992) terms double-loop learning (self-reflection that inspires further inquiry), evidence of the transformation of practice (Mezirow 1991), and the adoption of new skills and practices (Hargrove 1998). According to host academic and industry supervisors, students have developed new ways to ‘explain group work’; to ‘expand’ aspects of group practice, and to reflect on how the ‘group process’ has affected them (Tables 2 & 3).

Level Four Evaluation – Evidence of Group Skills Appropriation?

A level four evaluation measures the bottom line result of enterprise learning, and tries to ascertain whether this learning has had a positive effect on institutional outcomes (Kirkpatrick 1996). In other words, to what extent do ICTs contribute to, or impede the development of group work skills, and do they add value to existing learning practices? To ascertain whether this learning impacted on ‘graduate outcomes’, industry partners were invited to participate in the summative assessment of students who were completing their collaborative group work project as part of their final year of study. An assessment scale featuring twenty-two professional competencies was devised in conjunction with participating industry partners (Table 4 below).

Item	Not applicable		Below Performance		Average		Above Average		Outstanding	
	N	%	N	%	N	%	N	%	N	%
(1) Professional skills	2	6.1%	3	9.1%	5	15.2%	10	30.3%	13	39.4%
(2) Arrives promptly	2	6.1%	2	6.1%	13	39.4%	0	0	16	48.5%
(3) Is dependable	2	6.1%	1	3.0%	5	15.2%	13	39.4%	12	36.4%
(4) Works independently	2	6.1%	1	3.0%	2	6.1%	11	33.3%	17	51.5%
(5) Effective team member	10	30.3%	1	3.0%	2	6.1%	7	21.2%	13	39.4%
(6) Plans thoroughly and realistically	2	6.1%	1	3.0%	5	15.2%	12	36.4%	13	39.4%
(7) Is innovative	0	0	3	9.1%	8	24.2%	11	33.3%	11	33.3%
(8) Shows Initiative	1	3.0%	2	6.1%	7	21.2%	7	21.2%	16	48.5%
(9) Uses time effectively and efficiently	7	21.2%	1	3.0%	5	15.2%	13	39.4%	5	15.2%
(10) Understands client needs	4	12.1%	1	3.0%	6	18.2%	13	39.4%	9	27.3%
(11) Displays knowledge and understanding	3	9.1%	0	0	5	15.2%	20	60.6%	5	15.2%
(12) Ability to motivate and enthuse others	7	21.2%	3	9.1%	5	15.2%	13	39.4%	5	15.2%
(13) Coordination of group of clients	18	54.5%	0	0	1	3.0%	10	30.3%	2	6.1%
(14) Adjusts to circumstances	5	15.2%	1	3.0%	8	24.2%	9	27.3%	9	27.3%
(15) Relates well to staff	1	3.0%	1	3.0%	5	15.2%	14	42.4%	9	27.3%
(16) Relates well to clients	17	51.5%	0	0	0	0	9	27.3%	4	12.1%
(17) Oral communication	1	3.0%	2	6.1%	4	12.1%	12	36.4%	14	42.4%
(18) Written communication	2	6.1%	0	0	4	12.1%	11	33.3%	15	45.5%
(19) Team member	11	33.3%	1	3.0%	2	6.1%	4	12.1%	13	39.4%
(20) Seeks feedback	1	3.0%	2	9.1%	6	18.2%	15	45.5%	8	24.2%
(21) Response to advice and assistance	2	6.1%	0	0	4	12.1%	16	48.5%	11	33.3%
(22) Identifies weaknesses in own performance	3	9.1%	1	3.0%	4	12.1%	16	48.5%	7	21.2%

Table 4: Frequencies and Percentages of Responses for Each of the Items in the Professional Readiness Assessment

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These items were designed to address six competency areas: Professional attitude/approach (items 1–5); Programming/project planning (items 6–9); Leadership/team skills (items 10–14); Communication skills (items 15–19); Feedback and evaluation (items 20–22); and Employment potential (summarized as ‘yes’, ‘no’, or ‘maybe’)

Items 1–22 were responded to using a five-point Likert scale (horizontal axis, table 4 above). Data detailed here features a convenience sample of 33 respondents (17 female & 16 male) presented as frequencies and percentages (Table 4). Industry supervisors assessed a significant majority of students (19 [57.6%]) completing their full semester industry practicum as “work ready”, $\chi^2(2, N = 33) = 8.91, p = .01$. For those not deemed “work ready” (8 [24.2%]; 6 [18.2%] were deemed as “maybe” ready); a second semester subject subsequently named the ‘Reflective Practitioner’ encouraged all students to engage with supervisor feedback, to revisit their group work project, and to reconstruct different processes and outcomes in conjunction with academic and industry supervisors.

Where appropriate for assessment by academic and industry staff, group work skills were positively reviewed in most cases. Cross-group comparisons show that a significant (with Bonferroni adjusted $\alpha = .01$) number of students were scored highly for professional attitude/approach ($M = 3.47, SD = 1.17, t(18) = 12.92, p < .01$ (95% scoring between 2.91 and 4.04), programming/project planning ($M = 3.50, SD = 1.16, t(15) = 12.12, p < .01$ (95% scoring between 2.88 and 4.12), leadership/team skills ($M = 3.67, SD = 1.09, t(17) = 14.34, p < .01$ (95% scoring between 3.13 and 4.21), communication skills ($M = 3.71, SD = 1.11, t(16) = 13.83, p < .01$ (95% scoring between 3.14 and 4.27), and responding to feedback and evaluation ($M = 3.64, SD = 1.12, t(10) = 10.78, p < .01$ (95% scoring between 2.88 and 4.39). In other words, the vast majority of students performed at least ‘average’ in all categories, with the performance usually leaning towards ‘above average’. Considering how many students were reported as ‘work ready’, this data indicates that most students had progressed well down the path of ‘appropriating’ professional attributes beyond a basic level of use, to being able to demonstrate these through ‘cooperative interactions’ within an established industry setting.

ICTs, Social Presence & Context Cues – In Closing

This paper began by considering the limitations of online collaborative group work as a vehicle for developing critical graduate group skills competencies. Despite initial findings (Table 1) that students preferred (gained greater satisfaction from) individualised learning episodes rather than collaborative ones, level two, level three and level four evaluation steps (Kirkpatrick 1996) indicate that the ICT rich environment is very successful in;

1. Harnessing group skills development;
2. Facilitating transfer of group skills behaviours to situated (industry) practice, and;
3. Categorising, developing, codifying, measuring and aggregating group skills as a graduate attribute.

These productive outcomes can also be examined as a ‘constraint’ or ‘test’ of the adequacy of our existing knowledge about effective group skills development. In face-to-face group work, both ‘social presence’ and corresponding ‘social context cues’ are a necessary and integral part of the ‘group work’ process. In an ICT rich environment, this is less the case, given that ICTs are considered low social presence (Short, Williams & Christie, 1976), low social context cue settings (Sproull & Kiesler, 1986) and are (comparatively) stimulus deprived. Clearly, this calls for a new definition of group skills development that focuses on “the demands of the new world environment” (Blasi & Heinecke, 2000, p5). In data presented here, ICT-mediated group work appears to support a discourse on learning that expands and branches learning effort (Kirkpatrick Levels One & Two), and enhances the efficacy of the learner as they move into new group work settings (Kirkpatrick Level Three). A divergence in learning patterns, such that group skills acquisition varied across the cohort (Kirkpatrick Level Four) was identified within the current sample despite the common use of discussion forum moderators, whiteboards, web-casts, videoconferencing and real-time electronic talk as integrative learning tools. While these tools helped to centralise decision-making processes and exchange of ideas for students, none of these facilities seemed to directly replace group skills development as an essential performance characteristic.

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