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Learning to Collaborate to Learn

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1. Executive Summary

With measurement of collaboration about to be adopted in international benchmarks, it is time for greater attention to be paid to the development of appropriate policies, practices, pedagogies and assessments for collaboration.

Research has already provided useful models that identify progression from simple participation to sophisticated collaboration. These models can help to structure the development of collaborative skills and assessment of these skills.

It seems as though collaboration is not always a natural element of traditional teaching and learning, yet students are keen to learn collaboratively. Employers have identified collaboration skills as among the least developed through education but also among the most needed in the workplace. It is time for education to take a big step forward to adopt collaboration and to adapt its curricula and pedagogies accordingly.



2. Introduction

Many human activities involve not just the sharing of information and the coordination of social interaction, but also people working together to solve problems. When they do so, people not only interact, they “interthink” combining their intellects in creative ways so that they achieve more than the sum of the parts. In such problem-solving situations there is a dynamic engagement with ideas amongst partners, with language as the principal means for establishing shared understanding, testing possible solutions and trying to reach some agreement. Thinking together is an important part of life, but it has traditionally been ignored or even repressed in school. In recent years though, the potential value of children’s collaborative activity for their learning and development has begun to be appreciated.¹

One of the most engaging pieces of learning I ever witnessed had everything to do with collaboration. Children aged 8 or 9 were working together to create their version of a play they had been studying. They were recording their version using a digital camera, laptop computer and time-lapse photography. Their engagement in the task in hand was striking, with each child playing a specific role and the whole team self-organized. Some children manipulated the clay models that represented the play’s characters, another child captured the images at each appropriate moment, one more acted as the film director.

The children chatted happily about the characters, what they would be feeling and how they would react. It was the quality of their discussion that stood out, not that they were using technology or creating a film.

The fact that the children could enjoy a celebration of their work through review of their film was an added bonus, providing opportunities for them to enjoy it together and reflect on what might have been different or better. Their film was something that they could share and discuss with their teachers, parents or guardians or peers.

It could also become a handy revision piece for the play and its interpretation.²

Collaboration skills are also increasingly recognized as critical for success in later study, adult life and in work. Research by Woods Bagot³ on Education Futures and entitled “Why University Graduates Don’t Make the Grade” was based on an online survey of 500 business leaders. When asked “What percent of graduates applying to work with your company possess the skills they need to advance or be promoted at your company”, 43% of respondents said that fewer than 25% of graduates have the skills they need to advance. When asked “what are the three most important skills or attributes new hires need in order to succeed at your organization” the top three are Problem Solving (49%), Collaboration/Ability to Work as a Team (43%) and Critical Thinking (36%).

This paper is a reflection on collaboration, thinking behind its importance and how it might be encouraged and developed to support learning at school and beyond.



3. Collaboration – Good or Bad?

Andreas Schleicher, of the Organisation for Economic and Community Development has acknowledged the part that collaboration may play in education, saying⁴:

“Education today is much more about ways of thinking which involve creative and critical approaches to problem-solving and decision-making. It is also about ways of working, including communication and collaboration, as well as the tools they require, such as the capacity to recognise and exploit the potential of new technologies, or indeed, to avert their risks.”

So if we are to encourage and assess collaboration, how might we do so?

A good place to start answering that question seems to be with a definition of collaboration. Most definitions are along the following lines:

- the action of working with someone to produce or create something: eg he wrote on art and architecture in collaboration with John Betjeman.
- something produced or created in this way: eg his recent opera was a collaboration with Lessing

or

- treacherous cooperation with an enemy: eg he faces charges of collaboration.

These definitions seem to demonstrate bright and dark sides of collaboration. The focus of this paper is unsurprisingly on the first two definitions in which collaboration is the action of working with someone to produce or create something, or the description of something that has been produced.

However, even taking the brighter definition does not guarantee a positive result. Morten E. Hansen⁵, referring to collaboration and the world of work, says, “Bad collaboration is worse than no collaboration. People scuttle from meeting to meeting to coordinate work and share ideas, but far too little gets done. Employees from different units in a company squabble over who should do what on a common project and infighting consumes their work. This is a terrible way of working at the best of times: resources are wasted while better players pull away. It’s downright reckless in tough times, such as in a crisis, where the ability to pull together can make the difference between making it and not.”

Our challenge is therefore not simply to encourage collaboration, but to make sure we encourage effective collaboration.



4. Peer Learning and Collaboration

Throughout history, there have been many societal developments, the bi-product of which seems to have been collaboration. For example, as coffee houses became fashionable in European cities from the 17th Century onwards they developed into places where people with similar ideas and interests could meet to share their thoughts and sometimes to spark and support collaborative ventures.

Where peers share their ideas then work together for a common purpose, we possibly get the greatest opportunity for collaboration. On the other hand, collaboration can break down where one party presumes a pre-eminent role. If this is the case, then perhaps it suggests something about the way pupil – mentor relationships work and the degree of collaboration achieved in traditional classroom teaching. There seem to be many situations in which the desire for pre-eminence and ego may be an obstacle to effective collaboration. To make good collaboration more likely, perhaps we should consider some form of professional development course in humility. Unlike most other courses, you might start the course as an expert, and by its end you might have become a learner again.

Donald Clark⁶ summed up the importance of a more balanced pupil - mentor relationship as follows: “Teachers, lecturers and trainers, if not part of the peer [learner] group, often fail in getting learning to take place”

Stephen Johnson⁷ explains more about the potential value of collaboration and the status of collaborators. Johnson says, “A society organized around marketplaces, instead of castles and cloisters, distributes decision making authority across a much larger network of individual minds. The innovation power of the market place derives, in part, from this most elemental math: no matter how smart the “authorities” may be”, if they are outnumbered a thousand to one by the marketplace, there will be more good ideas lurking in the market than in the feudal castle. Cities and

markets recruit more minds into the collective project of exploring the adjacent possible. As long as there is spillover between those minds, useful innovations will be more likely to appear and spread to the population at large.”

EXAMPLE 1:

Tony Parkin: Reflection on Personal Learning and Collaboration Experience

Tony Parkin describes how collaboration helped him learn and develop early in his career. “David Beaumont and I were team-teaching on a Teacher Training in IT course at South Thames College in 1988.

David came from a Maths and Programming background and had also done a lot of teacher education too. He was a big Logo advocate, while I was a Hypercard enthusiast. Our arguments were around learning styles. I liked Hypercard as it allowed me to dismantle and learn from existing code, whilst Dave loved Logo as he liked to build solutions from the ground up. The different approaches used to be referred to as synthetic learning and analytic learning in those days. Debate was around whether you could combine the two approaches to reach a wider set of learners, in other words our trainee teachers, and to get them using Logo.

We ended up teaching Logo in both styles. We developed LogoBook, a tool that used a Hypercard-like multimedia toolkit approach to Logo hoping that we could inspire teachers whether they were analysts or synthesists. It gained local credibility and was published and put on sale by Inner London Education Computing Centre. In my view it was a self-motivated collaborative project developed by David and by me in the belief that both learning styles could be addressed and supported.”

Do people work individually or collaboratively, or are there stages that lead up to successful collaboration? Elizabeth Murphy¹ provides insight into what makes for successful collaboration in her paper “Recognising collaboration in an online asynchronous environment” and describes progression through stages from simple interaction to collaboration.

Ref: contribution by Tony Parkin (2012) – reflection on impact of collaboration on his personal learning

Do people work individually or collaboratively, or are there stages or particular tasks that lead up to successful collaboration? Elizabeth Murphy⁸ provides insight into what makes for successful collaboration in her paper “Recognising collaboration in an online asynchronous environment,” and describes progression through stages from simple interaction to collaboration in the context of an online environment.

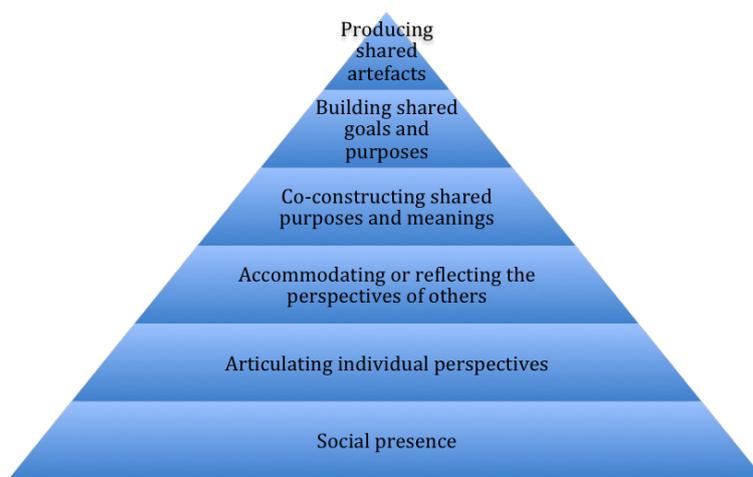


Diagram 1: Collaboration Model after E Murphy

Murphy identifies steps from participation to collaboration as we move through the levels of the pyramid. Social presence is simply about being in the environment, but may include developing understanding of appropriate behaviours. Articulating individual perspectives moves from what might be regarded as lurking to contributing personal perspectives before progressing up the pyramid to begin to acknowledge and work with the views of other participants. Between this third layer and the fourth is something of a breakthrough moment. A breakthrough from simple participation to collaboration and the beginning of working with others to make something together. The final two steps refine this collaboration so that it includes envisioning and planning something together with others then building it.

More recent research and more recent language is applied by Douglas Thomas and John Seely Brown⁹ who describe research conducted for the MacArthur Foundation by Mizuko Ito that provides a glimpse of how students today are learning in new ways. Ito and her team “constructed a typology of practices to describe the

way in which young people participate with new media: hanging out, messing around and geeking out.”

Thomas and Seely Brown describes the basic level of participation in digital environments that are requiring a sense of “learning to be”, which is “more about acquiring certain social practices that give meaning to experiences”. They describe this as “hanging out”.

The second level described by Ito as “When messing around, young people begin to take an interest in and focus on the workings and content of the technology and media themselves, tinkering, exploring and extending their understanding”. Within this framework a second dimension emerges, one that not only engages in playing, but begins to bring the concepts of knowing and making into contact with one another.

The third level of participation is “Geeking out” which involves “learning to navigate esoteric domains of knowledge and practice, participating in communities that traffic in these forms of expertise.” Thomas and

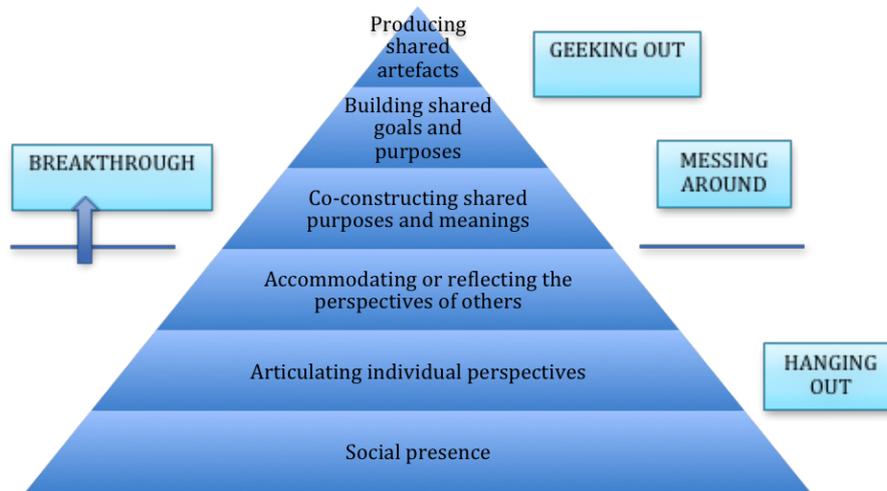


Diagram 2: Collaboration Model after E Murphy – showing Mizuko Ito’s behaviours of young people using social media

Seely Brown go on to say that “geeking out provides an experiential, embodied sense of learning within a rich social context of peer interaction, feedback and knowledge construction enabled by a technological infrastructure that promotes intense, autonomous interest driven learning. This kind of learning highlights the importance of the understanding of collaboration.”

Hanging out, messing around and geeking out seem to fit naturally into the Murphy’s framework, as shown below:



5. Designing Collaboration

Can you design collaboration? Perhaps, and we certainly can organize new ways of working.

The model for the World Innovation Summit for Education workshop was the epitome of collaboration. The traditional roles of workshop leader and participant had been turned on their heads and the result was collaboration, a more engaging experience for all and a success. Feedback from the session was positive and enthusiastic and provided evidence of the impact of changing roles to encourage effective collaboration.

Elizabeth Murphy's collaboration model can aid analysis of the development of collaboration through the workshop. While the example of the workshop and Murphy's model have quite separate provenance, it seems that the workshop took participants through steps of social presence (joining the first group), articulating individual perspectives (initial flip chart discussions) accommodating and reflecting the perspectives of others (flip chart discussions, accommodating previous groups' notes), co-constructing shared purposes and meanings (feeding back from all discussions around each topic) with building shared goals and purposes and producing shared artefacts arising from the final discussion.

EXAMPLE 2:

Gavin Dykes, Learners Voice at WISE

It was my privilege to work with the Learners Voice team at the World Innovation Summit for Education¹ in Doha in 2010 and 2011. During the 2011 event the team, comprising students from 22 to 26 years old, were challenged to present a workshop on advocacy in education. The team of 12 or so who had agreed to lead that workshop first reflected on those areas of education about which they cared. They came up with women's empowerment, learners' voice and health.

We discussed the potential format of the workshop and our discussion was heading down a traditional role, then Ivica Alpeza of OBESSU² spoke out. She had experience of organizing workshops in a completely different way, a way in which the participants were not passive recipients but active contributors and collaborators.

The traditional workshop would have had three presentations addressing the three identified areas of interest. When participants entered the workshop on advocacy at WISE 2011, they were handed a ticket indicating which of the three subject areas they were initially assigned. They joined that group for the first session in which a (learners voice) facilitator asked them for their views on the topic, women's empowerment, learners' voice and health. After twenty minutes they moved on to the second discussion. After a further fifteen minutes they moved to the third discussion. The shorter time reflected the fact that the first discussion was captured on a flipchart and so the second built on the first. The final session lasted ten minutes.

Throughout, these flipcharts facilitated discussions, each building on the previous. Not only did ideas flow, but also the participants grew more comfortable sharing their views and collaborating to develop a great discussion. By the time the three discussions were completed, the small groups had developed understanding and confidence in expressing their opinions with each other.

Following the last of the three discussions, a member of the final group in each subject area was asked to feedback to the whole group, summarizing all three discussions of the topic, using the flipchart records. After that presentation, the groups returned to a plenary session. Typically in that plenary session, the presenters at the front would have taken the stage and summarized conclusions. However, thanks to the WISE learners voice students, this too was turned on its head. The people at the front asked the "audience" questions about how they had arrived at the conclusions. This "flip" discussion was the liveliest, jolliest and most fruitful of conversations.

¹ WISE: <http://www.wise-qatar.org>

² Organising Bureau of European School Student Unions: <http://www.obessu.org>



6. Learning Through Collaboration

“According to Vygotsky¹⁰, the most important learning by a child occurs through social interaction with a skillful tutor. The tutor may model behaviours and or provide verbal instructions for the child. Vygotsky refers to this as co-operative or collaborative dialogue. The child seeks to understand the actions or instructions provided by the tutor (often the parent or teacher), then internalizes the information, using it to guide or regulate their own performance.” Of course the tutor need not be formalized as parent or teacher, but could also be a peer learner, friend or sibling.

“Shaffer gives an example of a young girl who is given her first jigsaw. Alone, she performs poorly in attempting to solve the puzzle. The father then sits with her and describes or demonstrates some basic strategies, such as finding all the corner/edge pieces and provides a couple of pieces for the child to put together herself, offering encouragement when she does so. As the child becomes more competent, the father allows the child to work more independently. According to Vygotsky, this type of social interaction involving co-operative or collaborative dialogue promotes cognitive development.”

How well is collaboration built into classroom learning today? Research conducted by Ipsos/Mori for Becta¹¹ provides some insight into preferred ways of learning and those typically experienced by pupils in English schools. The research (outlined in Diagram 3 and Diagram 4 below) shows that the predominant student preference is learning by working in groups yet the predominant experience is solitary learning.

This UK experience is reinforced by results of a survey of learners conducted by Taking IT Global for an Innovative Students Forum, and summarized eloquently in the Wordle image in Diagram 5. The Wordle indicates the ways in which these Innovative Learners like to learn.

Does this matter? Are the students right or are the teachers right? Presumably it is the teachers who tend to organize learning in a solitary way? It would seem self evident that working in groups provides greater opportunity for learners to develop those collaborative experiences that appear to be critical for learning, and those collaborative skills most sought after by employers.

Which three of the following do you do most often in class?

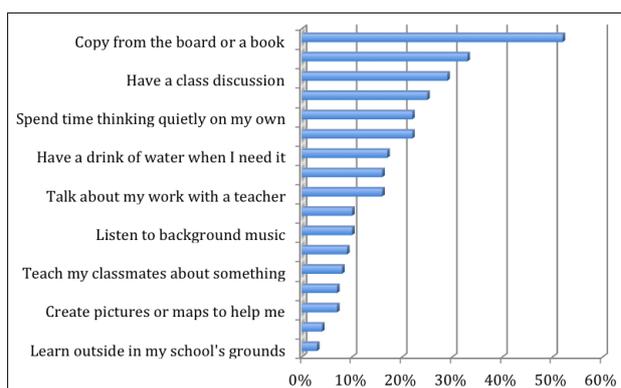


Diagram 3: Learner experiences of working in class

In which three of the following ways do you prefer to learn?

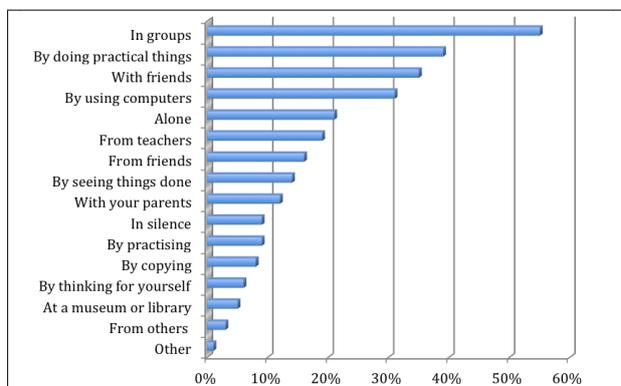


Diagram 4: Learner preferences for working in class



Authors: Gavin Dykes, Martin Ripley, Guus Wijngaards, Ignacio Rodriguez and Ponce Ernesto Samaniego
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Diagram 5: Student preferences for learning from the Innovative Students Forum (via Michael Furdyk, Co-Founder Taking IT Global)



7. Further Collaborative Learning Examples

There are many examples of collaboration being developed in learning and through learners' experiences and some of these are captured in the examples below.

7.1 Collaborative Learning: Case Study 1 Dr Guus Wijngaards, Netherlands¹²

I believe that the greater a student's involvement in the design of her learning, the greater her motivation and the stronger her sense of responsibility for her own learning process. Collaboration and collaborative learning are critical components that help ensure quality in associated teaching and learning processes.

'Knowmads'¹³ provides one example of development of successful learning practice based on collaboration between teachers and pupils. The Knowmads website explains: "As a school we educate young creative entrepreneurial spirits. We believe it is our job to enable, facilitate, empower and inspire our students to become change-makers. As a platform we connect our students, partners, staff, advisory board and a wide network of professional and volunteer expert and contributors to share their talents, creative ideas and inspiration. We aim to initiate positive change".

The Inholland Centre for eLearning carried out research¹⁴ to investigate the characteristics of successful innovative learning practices using Web 2.0 technologies. Knowmads's 'primary goal is to develop professional expertise and competencies in the field of international business, with a focus on the integration of practical knowledge and professional skills while carrying out realistic professional tasks'.

Collaboration is a core component, which not only leads to strong group bonding, but also establishes a community membership through which learners develop their own sense of identity. Much of the good practice associated with Knowmads is based on collaboration.

Knowmads teachers focus on building on students' knowledge, experience and culture. Teachers are no longer solely responsible for setting goals, designing learning tasks, and assessing what is learned. Students are invited to set specific goals within the framework of what is being taught, to provide options for the activities that capture student interests, and to encourage students to assess what they learn.

Learning through Knowmads also involves communication and collaboration with professionals from participating private sector companies and organisations. Technology is used not only to make learning more interesting and engaging, but also because it offers a variety of learning approaches and adaptations to students' personal learning preferences.

Knowmads provides a model and a mechanism through which collaboration skills can be developed, from the initial simple participation through to full collaboration as defined in Murphy's model for collaboration.

7.2 Collaborative Learning: Case Study 2 Ignacio Rodriguez¹⁵, Venezuela

Good collaboration leads to synergy where the outcome is greater than the sum of the individual collaborative contributions. My best and favourite examples of collaboration come from social projects that I've had the good fortune to work on and in which, I believe, shared passion and interests have been critical components.

Just over a year ago, I attended the World Innovation Summit for Education in Qatar as member of a group of 20 very committed and energetic "Learners Voice" students. Our backgrounds were diverse geographically, professionally and personally. As a group, our challenge was to "blog, talk and interview" our way through the summit. The summit itself involved 1000 leaders in innovation, education and society. With only a couple



of day's preparation, we had to gel as a team, navigate our way through the 3 day summit and work together to leave our own legacy and impact on the WISE event. Throughout those three days, we learned to work in small teams as well as contributing to the overall group, to work under pressure and to stay focused and productive. We learned to share and to support each other and in the short time strong and lasting friendships were developed. Some of us had roles as speakers, others tweeted, blogged, interviewed, filmed and recorded and edited. By the end of WISE we had pulled all our work together as a single product that represented our group: the Learners' Voice.

I had a second major experience of collaboration and learning through an educational awareness campaign. The campaign was called EduAccess and was intended to improve access to education in a diverse range of communities and countries around the world. The team comprised 30 people split across four different countries with several other people supporting the core group. One of the biggest challenges we faced was in achieving effective communication. We were spread across completely different time zones, from Colombia to Nepal so it was incredibly hard to coordinate our efforts and activities. I had the privilege to lead the project and connect the leaders from each participating country. For me, effective communication and collaboration was key to a successful campaign. Given our different contexts and cultures, finding a common goal for the group was a challenge. We identified the issues in each location (quality in Jamaica, access in Brazil, equal rights in Egypt) and brought these together in a joint effort and common goal of improving education. The experience taught me that our different backgrounds and personal situations can be a great benefit. We can learn from the wide range of experiences and perspectives. If we listen as well as share, we can generate all kinds of ideas and work together to build them into solutions that can benefit us all.

Globally I realise how important and essential collaboration is as a skill for growth and development. Increasingly companies expect their employees to have well developed collaboration skills. So the debate now seems to be around how education systems must change to accommodate and develop collaboration skills for all students.

In Ignacio's experience at WISE, he seems to have worked through a number of the levels of Murphy's model of collaboration, with the ultimate development of the combined Learners' Voice product. The group's work immediately before the WISE conference effectively took the participating students through several of the initial levels enabling the Learners Voice participants to share their individual perspectives, to accommodate other perspectives and to begin to co-construct shared purposes and meanings. All of the work was carried out with a sense of urgency and pressure, which appears to have added to the sense of common purpose and the importance of collaboration.

7.3 Collaborative Learning: Case Study 3 Ponce Ernesto Samaniego¹⁶, Philippines

It is common practice in many business schools to encourage working in groups. The intention is to prepare students for a field where working with others is both a necessity and attractive, knowing that basic economics tells us that specialization leads to increased productivity. Usually, students are formed into groups and given case studies or tasks such as writing business or marketing plans. Learners are challenged to collaborate, simulating the intricacies and challenges of managing interpersonal relationships in the workplace.

One business class that takes collaborative learning to a higher level is the Brand Management course taught by Professor Raymund Acedera in the College of Business Administration at the University of the Philippines. Currently in its 9th semester of presentation, Brand



Management is a higher Marketing elective and one of the most popular courses in the College.

Professor Acedera has designed the course to include collaborative working within groups as well as between groups, to simulate the experience of managing brands in a highly competitive business environment.

At the beginning of the semester, learners are grouped into teams called 'Brand Groups.' These Brand Groups comprise around seven learners, and the whole class is composed of about six Brand Groups. Each Brand Group is then assigned a real brand that it will simulate managing for the duration of the semester. Brands assigned are from different industries including personal care brands, technology brands, and more.

Lectures and 'rounds' are alternated throughout the semester. Rounds are assigned outputs from Brand Groups that will be presented in class such as Market Analysis (round 1), Business Objectives (round 2), Marketing Strategy (round 3), Innovation (round 4), culminating with the Integrated Marketing Communication (round 4). These rounds are steps that together, comprise a comprehensive marketing plan. During these presentations, a group is assigned to critique the presentation of another group. After all the presentations, each Brand Group votes for which group they felt performed best. The votes will be combined with the professor's scores to produce the ranking for every round.

Collaborative learning through interaction among the Brand Groups is also utilized. During the Innovation Round, the Brand Groups act as both Marketing Management Team for their assigned brands and as a Research Agency for another brand. The Brand Groups are assigned to produce an output called an Innovation Board for a proposed product or brand innovation on their assigned brands. A brand or product innovation is

a new offering from the brand (such as a new variant, a new product under the brand, etc.) that aims to help the brand achieve the business objectives set out by the team. Using the Innovation Board, another team is assigned to act as a research agency to test the viability of the innovation given a set of criteria. Through this model, the teams experience both being clients and being providers and are given opportunities to rate and feedback the performance of the client and provider.

Mastery of certain lessons will require working in smaller groups. During the course of the semester, learners are also grouped into "Triads", or groups of three for one assigned work. They are given case studies where they will utilize what could be the semester's most important marketing tool, the Brand Framework.

The design of the Brand Management course uses both competition and cooperation as means for collaborative learning. As an effective practice, the class enhances the learning experiences of the students in preparation for a field where teamwork is a prerequisite to success.

This case study suggests a sophisticated approach to the development of collaboration and collaborative skills. Small groups provide opportunities to move quickly through the levels of Murphy's Collaboration Model to producing shared artefacts. Interaction between the groups brings an additional layer of development of collaboration simulating practice in the world of work and providing insight into collaborative strategies for business.

7.4 How should we assess collaboration? Case Study 4

Martin Ripley, United Kingdom

Employers are often rightly interested in how staff interact, work collaboratively and how people contribute to teams. Staff selection is currently most often based on judgements made about these issues through the lens



of an interview, rather than on the basis of qualifications. Many employers choose to use commercially available profiling tools as part of the interview process. Such profiling tools include Myers Briggs¹⁷, Lifo¹⁸ and OPQ¹⁹ (Occupational Personality Questionnaires) which assess applicant suitability and can be used to support professional development of an organisation's staff.

One initiative that has sought to develop an approach to the teaching and assessment of collaboration in a schools context is the Assessing and Teaching of 21st Century Skills (ATC21S)²⁰ project.

One strand of the ATC21S project focused on developing a domain framework for collaboration and communication, then set out to develop a method of assessing students' progress in this domain. ATC21S sees collaboration and communication as having three aspects:

- Knowledge: which includes all references to specific knowledge or understanding requirements
- Skills: which include the abilities, skills and processes that curriculum frameworks are designed to develop in students and which are a focus for learning
- Attitudes, Values, Ethics: which refer to the behaviours and aptitudes that students exhibit

Educators have tried and proven approaches to specifying and testing "Knowledge". However, there is less certainty about how we might assess "Skills, Attitudes, Values and Ethics". As a result, the ATC21S project has sought to develop a more detailed specification of what "Skills, Attitudes, Values and Ethics involve in the context of collaboration and communication. The ATC21S project identifies participation, perspective taking, social regulation and problem solving as the four key elements.

The table below provides more detail about how these key aspects have been divided into elements and sub-elements.

Element	Aspect	Sub-aspect	
Participation	Contribution	Action	
		Interaction	
	Task completion		
Perspective taking	Responding		
	Audience awareness		
Social regulation	Negotiation		
	Knowledge of self		
	Knowledge of others		
	Responsibility		
Problem solving	Planning	Goal setting	
		Managing resources (human and other)	
		Course of action	
	Process	Systematic approach	
		Problem analysis	
		Information need	
		Reasoning	
	Open-mindedness	Tolerance for ambiguity	
		Flexibility	
	Learning	Knowledge building skills	
		Acquiring knowledge	

Table 1: Elements, Aspects and Sub-aspects of Collaboration and Communication

Links between these elements and Elizabeth Murphy's Collaboration Model and its hierarchy can be identified. For example, tolerance for ambiguity and flexibility might be associated with the collaboration models "accommodating or reflecting the perspectives of others". However, associating aspects and sub aspects with progression from interaction to collaboration is not straight forward as the table stands.

Approaches to assessing collaboration and communication

One approach to assessing collaboration and communication is to develop an Inventory Assessment. Inventory assessments consist of a range of statements, with the student asked to rate the extent to which they agree or disagree with each statement. For example, imagine the following selection of statements.



Diagram 4 – Inventory Assessment

	Strongly Disagree				Strongly Agree
<i>I like to know what the end result will look like</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>I generally know how much money I have to spend</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>You can never know what's going to happen so it's better just to get started</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<i>When eating a meal, I eat the bits I like first</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Worry about today - tomorrow will take care of itself</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<i>I am always running out of money</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

A full Inventory Assessment consists of many such statements. When responses are analysed these reveal patterns in the student's preferences and approaches, and provide insight into how he or she prefers to approach collaboration and getting things done. The analysis can be used to generate reports in forms designed to be particularly useful to the student. For example, the report might reflect the "Values" that appear to underpin the student's behaviours, the "Goals and Strengths" in the student's responses as well as describing the student's "Behaviours" as shown in Table 2 below.

Values	[This student] seeks to focus on the process of problem solving, especially in group settings. Consensus and flexibility are strong themes.
Goals and Strengths	Flexible. Knowing people. Getting Along. Enthusiastic. Listening. Researching. Checking understanding and consolidating.
Behaviours	[This student] focuses on social interactions and wherever possible communicates positive feelings about others in a group. Sensitivity to feelings leads [this student] to focus on win:win outcomes. Resourcing and planning ahead are less important than responding flexibly to changing circumstances.

Table 2: Sample student report following inventory assessment

Conventional and inventory assessment of collaboration

Inventory assessments are not widely used in educational contexts. Educators tend to prefer to observe actual student behaviour, to score it and to make judgements about the knowledge and skills that underpin the observed behaviour. A maths test works like this: students work through a set of maths problems, the student's solutions are scored, and then judgements are made about how much mathematics the student understands.

This approach works well enough in mathematics, not least because the routines required from a student taking a test (working alone, quietly tackling each maths problem in turn) is not unrelated to some real-life mathematical activity. However, with collaboration and communication, designing a test which mirrors real-life activity is more challenging. After all, one of the most common rules of exams is that students should not collaborate or communicate. Such behaviour is perceived as cheating.

The ATC21S project has developed some computer-based assessments in which paired students work together to solve problems. Design of the assessments has involved two types of problem:

- Problems in which each of the students has a different set of information, all of which is needed to solve the problem.
- Problems in which the two participating students have access to different functionality, so that the pair have to collaborate to get things done.

In all of these computer-based tasks, the students are provided with a messaging interface that enables them to communicate. The semantic structure of the text entered into this space is analysed to provide information about the extent to which the students showed evidence against the ATC21S framework as shown in Table 1 above.



One of the issues with “conventional assessment” of collaboration is whether fair human-to-human collaboration is completely feasible, as the collaboration by definition depends on both parties. One alternative is to assess it through human interaction with a virtual partner, almost a present day variation of Turing’s original thoughts around the “Turing Test”²¹.

Another concern with the approach to conventional assessment of communication and collaboration is the recognition that human to human interaction can have high degrees of sophistication that include for example humour, supposition and taking false positions to illicit particular responses. Overly reducing communication and collaboration to some algorithmic measurement using technology may be taking it too far and could run the risk of encouraging more of “bad collaboration” identified in section 2 of this paper.

The hope must be that assessment of collaboration, when it finally emerges in to the mainstream, will support rather than undermine good collaboration and that it will not simply measure what can easily be measured for ease of grading. Recognizing Murphy’s model and progression to sophisticated collaboration might be offer one route to a successful method of assessment.



8. Conclusions

Communication and collaboration skills are increasingly recognized as being of fundamental importance. This paper provides a few examples and reflections on experience that demonstrate how development of these skills is being encouraged and how they might be assessed.

Murphy's collaboration model provides a helpful hierarchy for the development of skills and practice from interaction to collaboration and the identified examples can be assessed against that hierarchy.

With the OECD committed to inclusion of collaborative skills in PISA 2015, the focus on development and assessment of communication and collaboration skills will surely continue to grow. Care will be needed in the selection of methods that are used. Past history of assessment has shown us that assessment can have unforeseen impacts with classroom practice developing in imitation of tests and just as collaborative skills are of critical importance, so must our methods of assessment encourage the best aspects and behaviours of collaboration.

Now is the time for education's professionals to pay closer attention to full Inventory Assessment as a model for measuring collaboration, or to pay particular attention to other models so that they achieve the desired influence and fair outcomes.

Recommendations for education

Pupils and Students

From Becta's and Taking IT Global's research, it would seem that your preferences for learning are typically associated with collaboration. Keep developing your collaborative skills and hopefully the rest of education will catch up with you sooner or later.

Teachers

Acknowledge the importance of collaboration in life and work, and as an aid to learning. Look for the ways in which you can develop the pedagogies you use to encourage co-design and co-production and ultimately collaboration. With PISA tests heading in the direction of including measurement of collaboration, begin to prepare the way for you, your teaching and your students by engaging a much more collaborative approach to teaching and learning, and encourage development of your students' collaborative skills.

Policy Makers

Acknowledge the growing importance of collaborative skills and their forthcoming adoption by PISA and others. Encourage approaches in pedagogies and curricula that in turn encourage collaborative activity. Recognize that collaborative approaches run against some cultures of traditional learning and where they exist, begin to change these now.



9. Biographies

Gavin Dykes

Gavin Dykes is an international advisor on innovation, technology and education. His current roles include Education Fast Forward Fellow (UK), Education World Forum Programme Director, Senior Director of International Relations of the New Media Consortium (US) and Education Impact Fellow (France). In the past he has worked as a Associate Director of the Innovation Unit as well as Associate Director of Futurelab. Gavin's current focus is on promoting development of learners' role in directing and managing their own education, and encouraging learning by doing real things that have positive impacts on learners' communities and society as a whole.

Martin Ripley

Martin Ripley is a leading international adviser on 21st Century learning and technology. Martin is co-founder of the 21st Century Learning Alliance which campaigns for a compelling view of learning in the 21st Century. Acting on behalf of sponsors, Martin is also involved in establishing a new academy in Hammersmith and Fulham. The new academy will focus on new ICT and Creative/Media specialised diplomas. Previously, Martin was director of e-strategy at England's Qualification and Curriculum Authority; he has acted as adviser to West Virginia, US on e-assessment, and in Hong Kong on the development of an academy for gifted pupils. He led development and implementation of National Curriculum testing in the UK; was Director of the 160,000-strong student academy, based at the National Academy for Gifted and Talented Youth at the University of Warwick. Martin also acts as a consultant to Wireless Generation, based in New York

Ignacio Rodriguez

Ignacio Rodriguez is currently finishing his university studies in production engineering in Caracas, Venezuela and is also working as Associate Consultant for Education Impact, an Education/technology consultancy company. Ignacio is passionate about what education can do and for the last three years he has focused and his devoted his career towards it. In 2010, Ignacio spent 3 months developing a project associated with TakingITGlobal's Sprout e-course to help combat the significant inequalities of public education in Venezuela. Two months later, Ignacio was selected to attend the Latin America Youth Summit in Brazil as a British Council Global Changemaker where he helped create and manage a project called Edu-Access. The project was designed to inform a greater number of people about inequality in the education systems of a range of countries including Egypt, Colombia, Brazil and Jamaica.

Ignacio was invited to attend the World Innovation Summit for Education (WISE) in Qatar as part of a 20 student group. The "Learner Voice" group were challenged to engage participating education leaders, to interview them and to debate the importance of including students in their discussions. At the beginning of last year Ignacio addressed the opening ceremony of the Education World Forum in London, where 50 Ministers of Education attended and a total of 65 countries were represented. He explained the importance of involving young people in decision making given that young people are most affected by the decisions that Ministers are making. Most recently Ignacio co-facilitated the Global Youth Summit 2011 with the British Council and also returned to Qatar for the 2011 WISE Summit to coordinate the Twitter strategy for the whole conference. He strongly believes that education is the core contributor to solving the most pressing problems the world faces. For this reason Ignacio plans to focus on education in his future career.



9. Biographies *(continued)*

Ponce Ernesto Samaniego

Ponce Ernesto Samaniego is a student and a start-up social entrepreneur from the Philippines. Ponce co-founded Outliers, on his senior year at the Business Administration program at the University of the Philippines. Together with a young and dynamic team, he is driven by the mission to empower Civil Society groups through the channel that they know best: business development. By merging traditional practices of aid organizations with efficient, market-based approaches, Outliers is effectively turning charities into sustainable social enterprises. Outliers was named Philippine Winner out of 156 social businesses in the BiD Network and Citibank's Business in Development Challenge 2010, and is supported by the Starbucks Foundation, VF (Visayan Forum Foundation), Japan Environmental Education Forum and the Global Changemakers Programme (British Council).

Ponce is a Global Changemaker (British Council), Global Shaper (World Economic Forum) and a Young Challenger (Grameen Creative Lab). As a recipient of an Erasmus Mundus Mobility with Asia Scholarship from the European Union, he spent a semester in the International Business program of the University of Warsaw (Poland) in 2009.

Serving the role of Learners' Voice, he was a speaker at the World Innovation Summit for Education 2011 (Qatar). He is also an active environmental advocate and has represented the Philippines recently in international forums such as the ASEAN Youth for Sustainable Development (Indonesia) and UNEP's Southeast Asia Youth Environment Network and the World Youth Summit for Volunteering (Singapore).

Guus Wijngaards

Before Guus Wijngaards (1949) started to work as Professor on eLearning at the INHOLLAND University for Applied Sciences, he was working as a Teacher, Researcher, Journalist, Foreign Secretary of a Dutch teacher union, Secretary General of the European Association of Teachers (AEDE), Editor in Chief and Projects Manager of CONTEXT and finally as Deputy Director of EUN (European Schoolnet). He attained in May 1973 an MA in Dutch language and literature and in February 1986, an Arts PhD on European cultural and scientific history. He has published several books and more than 350 articles on educational, cultural, foreign political and literary subjects. INHOLLAND Centre for eLearning: www.inholland.nl/elearning



10. Endnotes

- 1 Mercer, N. & Littleton, K. (2007) *Dialogue and the Development of Children's Thinking: a sociocultural approach*. London: Routledge.
- 2 Notes from an Innovation Unit visit to Crosshall Junior School, St Neots, England
- 3 http://www.woodsbagot.com/en/Documents/News_documents/Business_Schools_EducationFutures.pdf
- 4 Shleicher A, OECD website (retrieved 2011) The case for 21st Century Learning, http://www.oecd.org/document/2/0,3746,en_2649_201185_46846594_1_1_1_1,00.html
- 5 Morten T. Hansen (2009) "Collaboration – how leaders avoid the traps, create unity and reap big results"
- 6 Donald Clark (January 2012) http://www.youtube.com/watch?feature=player_embedded&v=rqtyzt7rzTs
Retrieved 27 January 2012
- 7 Stephen Johnson (2010) "Where Good Ideas Come From – the Natural History of Innovation: Penguin
- 8 E Murphy (2004) *Recognising Collaboration in an online asynchronous environment*
- 9 Douglas Thomas and John Seely Brown (2011): *A New Culture of Learning – Cultivating the Imagination for a World of Constant Change*
- 10 Saul McLeod (2007) <http://www.simplypsychology.org/vygotsky.html>
- 11 Becta (2008); *Harnessing Technology: Next Generation Learning 2008-2014*
- 12 Dr Guus Wijngaards (2012) Professor of eLearning, INHolland University
- 13 Knowmads is a project based in Amsterdam – see www.knowmads.nl
- 14 Fransen, J. & Goozen, B. (2011). *The Transfer Value of Successful Learning Practices Using Web 2.0*. In K. Moyle & G. Wijngaards (eds.), *Student Reactions to Learning with Technologies: Perceptions and Outcomes* (pp. 269-290), IGI Global
- 15 Ignacio Rodriguez is currently a student at University in Caracas, Venezuela
- 16 Ponce Samaniego is currently a student at the University of the Philippines.
- 17 <http://www.myersbriggs.org/my-mbti-personality-type/mbti-basics/>
- 18 The Lifo Method comprises paper based and on-line survey and support materials that can be used in resourcing, team and individual development
<https://www.lifeorientations.com/public-zone/lifo-area/whatislifo-page-1.aspx>
- 19 OPQ or OPQ32 are widely used occupational personality questionnaires which are used as an indication of an individual's behavioural style at work
- 20 ATC21S is an international research effort aimed at empowering students with the right skills to succeed in the 21st Century workplace supported by Cisco, Intel and Microsoft <http://atc21s.org/>
- 21 Turing held, most fully and confidently, that computers would, in time, be programmed to acquire abilities rivalling human intelligence.... Turing put forward the idea of an 'imitation game', in which a human being and a computer would be interrogated under conditions where the interrogator would not know which was which, the communication being entirely by textual messages <http://www.turing.org.uk/turing/scrapbook/test.html>

