A blended synchronous learning model for educational international collaboration

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Educators and students living in the digital age are faced with complex problems that are forcing them to seek collaborative solutions. These problems can be addressed through the successful application of digital technologies and pedagogies that enhance the educational, social and economic prospects of students. The main aim of this study was to propose a blended synchronous learning model and to show how this model can be adopted for better supporting educational international collaboration. The paper describes how the authors have applied advanced synchronous learning technologies and pedagogies to maximise interconnectivity and social interactions to engage in a range of educational collaborations in the last seven years.

Keywords: blended synchronous learning model; synchronous cyber classroom; synchronous learning; cyber face-to-face; cyber collaboration

Introduction

This paper puts the case that international collaboration is an imperative for tomorrow’s educators in an increasingly competitive digital marketplace. We describe specific pedagogical models that we have developed through collaborations in the last five years that maximise the educational, social and economic potential that the Internet and new communication technologies have promised. Information communication technologies (ICT) allow the simultaneous transmission of voice, data and video. The use of ICT in digitally connected communities and workplaces is now commonplace and their innovative applications in education are well documented (Chen & Wang, 2008; Hastie, Chen, & Kuo, 2007; Hastie, Chen, & Todd, 2008; Zhu & Smith, 2009). However, the promised potential of the digital age has yet to be determined.

The young citizenry of these grid communities will drive the decentralised mindset that parallels the traditional centralist view of life that will be relegated to the past (Chak & Leung, 2004; Prensky, 2008). Digital technologies accelerate the reorganisation of their brain cells through a phenomenon known as ‘neuroplasticity’ suggesting the brain has the ability to grow new neurons and rewire itself (Begley, 2007). Research suggests enhanced cognitive function in concentration, memorisation and multi-tasking for students using digital technologies such as the synchronous cyber classroom where participants work brain-to-brain (Hastie & Chen, 2006) with

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multiple participants from multiple locations and multiple time-zones (Hastie, Chen, & Todd, 2008) and through the use of Web 2 technologies (Zhu & Smith, 2009).

Habits of mind can be explicitly taught, encouraged and assessed as part of pedagogical process. Hence, the role of the teacher is central to the development of habits of mind due to the emphasis on learning specific outcomes through explicit pedagogical strategies, instructional design and instructional theory (Smith & Moore, 2006). The teacher is charged with the management of learning processes which can effectively facilitate students’ learning through the use of expert, direct, research-sanctioned pedagogical strategies. The digital age has given teachers a growing range of digital tools to achieve these outcomes. The tools extend beyond mere hardware to pedagogical practice such as strategies to guide teachers in the development of ‘best practice’ in instructional design when using synchronous cyber technologies (Hastie & Chen, 2007). When teachers provide direct instruction to students using synchronous cyber face-to-face technologies the learning outcomes for the students have been found to outperform all other modes of instruction, including face-to-face instruction in the traditional classroom (Chen & Wang, 2008). This occurs when there is an orientation towards performance and the achievement of the learning outcomes set out in curriculum documents and polices.

The worked described in this paper investigated the imperative for educators to engage in international educational collaborations to prepare digital learners and retain market share in an increasingly competitive digital marketplace. Firstly, a holistic blended synchronous learning model is proposed to offer educators a systematic framework for conducting educational international collaborations using different combinations of physical classroom and synchronous cyber classroom. Secondly, six case studies implementing some of the modes were used to describe specific pedagogical approaches that have been developed by the authors to maximise the educational and social potential. The aim of the paper is to provide a blended synchronous learning model for instructors to be aware of all possible modes and adopt whatever mode they think is suitable and useful.

**Blended Synchronous Learning Model**

The fundamental concept of blended learning is to combine at least two or more learning settings into a flexible learning environment. In this case study, we focus on the integration of physical classroom and cyber classroom settings using synchronous learning to enable unlimited connectivity for teachers and students from any part of the world. The Blended Synchronous Learning Model (BSLM) consists of five basic elements: the cyber classroom, the physical classroom, the teacher, the student, and a number of classrooms or participants. According to the above definitions, there are nine possible modes that derive from the BSLM as shown in Table 1.

The BSLM consists of the five basic elements: teacher, student, physical classroom, cyber classroom, and number of classrooms or participants. Therefore, a function-like representation of all the different modes in BSLM using these five basic elements is provided for better representations. The letter ‘T’ represents ‘a teacher’, ‘S’ represents ‘a student’, ‘P’ represents ‘a physical classroom’ with setup as shown in Figure 1, ‘C’ represents ‘a cyber classroom’ with setup as shown in Figure 2, and ‘n’ represents ‘many’ (n > 1). These letters can be combined to describe any individual mode in BSLM. For example, ‘nS’ represents ‘many students’, ‘nT’ represents ‘many teachers’, and ‘nP’ represents ‘many physical classrooms’. Hence, a mathematical
function such as \( n_{P}(T, n_{S}) \) can be derived from \( T \), \( n_{S} \) and \( n_{P} \) to represent ‘many physical classrooms interconnected and supported by a Synchronous Learning Management System (SLMS) with each physical classroom consisting of one single teacher and many students’.

**Mode 1**

None of the teachers are participating in any classrooms. Students are participating both in physical classrooms and in cyber classrooms (Figure 3).

**Application scenarios**

For an e-commerce course, a group of students sitting in a physical classroom in Paris interviewed a student from Helsinki in a cyber classroom about his success and expertise in personal trading on the eBay website. In another example, a group of students

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Table 1. Blended Synchronous Learning Model.

<table>
<thead>
<tr>
<th>Cyber classroom</th>
<th>Physical classroom</th>
<th>Descriptions</th>
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</tbody>
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Note: 1 means with one or more participants; 0 means without any participants.
from different countries formed a team to participate in the ThinkQuest contest on the topic of garbage recycling. They wanted to collate data from students in multiple classrooms from different countries.

**Mode 2**
Teachers are participating in physical classrooms only. Students are participating in cyber classrooms only (Figure 4).

**Application scenarios**
The Discovery Channel has set up an advanced 3-Dimensional Virtual Reality (3D VR) exhibition studio and is offering an online live programme for interested students to participate via the Internet. The programme is running 60-minute sessions each based on pre-scheduled time slots. Sessions could consist of a single teacher conducting the demo or a group of teachers working in a team for collaborative demonstrations.
Another example would be linking two or more physical 3D VR studios in different countries to provide more versatile learning features for students.

**Mode 3**

Teachers are participating in physical classrooms only. Students are participating both in physical classrooms and in cyber classrooms (Figure 5).

**Application scenarios**

A typical example of this mode was a teacher teaching in a physical classroom with many students sitting in front of the teacher, with other students who could not attend physically participating online in the cyber classroom, from wherever they were...
located. One of the authors implemented this mode of teaching in the blended synchronous classroom at the National Sun Yat-sen University with on-campus students in Taiwan plus students participating from China and the Philippines as shown in Figure 1. Another potential application would be linking two or more blended synchronous classrooms together with teachers teaching the same subject in different universities for collaborative team-teaching.

**Mode 4**

Teachers are participating in cyber classrooms only. Students are participating in physical classrooms only (Figure 6).

*Application scenarios*

A typical example of this mode was a teacher teaching in a cyber classroom with the students sitting in a physical classroom. This was particularly useful when the teacher is off-campus and travelling in different places attending conferences or meetings. One of the authors has been practising this mode of teaching for students from many different countries like Taiwan, Italy, USA, Finland, Australia, and Portugal. It allows teachers the choice to work outside the walls of a traditional physical classroom and offers greater flexibility in the arrangement of classes. If the course is arranged to be delivered (shared) between many universities at the same time, it would be a more cost-effective educational delivery for many universities in Asia.

**Mode 5**

Teachers are participating both in physical classrooms and in cyber classrooms. None of the students are participating in any classrooms (Figure 7).

*Application scenarios*

This mode was designed specifically for professional teacher-training activities. A typical example of this mode is many teachers participating in a synchronous cyber classroom for online professional training programmes receiving lectures from a

![Figure 6. Mode 4.](image-url)
trainer presenting from a physical training studio. This mode of training is a time and cost-effective alternative for trainees travelling back and forth to the training centre. Another example is a group of teachers in the same school forming a collaborative team-teaching group by consulting an external expert for instructional design guidelines and advice.

**Mode 6**
Teachers are participating both in physical classrooms and in cyber classrooms. Students are participating in physical classrooms only (Figure 8).

**Application scenarios**
A typical example of this mode was a teacher teaching in a physical classroom with many students sitting in front of the teacher with an invited external expert giving a
talk to the students. This is a very common practice of inviting external speakers in traditional classroom settings; however it means the invited speaker must physically attend the classroom in person. This can have associated drawbacks or limitations depending on the availability of the invited speaker and travel requirements. With the flexibility of the synchronous cyber classroom, a teacher can invite external experts from multiple countries and multiple locations. One of the authors assembled a team of external experts including a professor in New York (to talk on computer networks) and a professor in Finland (to give a talk on e-learning theory and practice). Thus, a teacher can work collaboratively with a group of external experts in the same field from different countries to deliver panel discussions for students (Chen, Ko, Kinshuk, & Lin, 2005).

**Mode 7**

Teachers are participating in cyber classrooms only. Students are participating both in physical classrooms and in cyber classrooms (Figure 9).

**Application scenarios**

A typical example of this mode was a teacher teaching an online course for students in a cyber classroom with some students participating from a physical classroom. A physical classroom can be provided by an educational institution to enable students who do not have access to digital technologies or Internet connections to participate in online courses. Students who are easily distracted when participating in a synchronous cyber classroom from their own site (usually from home), can gather in a physical place to work together. One of the authors has encouraged geographically isolated students enrolled in online courses to form a study group within their own city or country so they can join together in a physical place to participate in synchronous classes (Wang & Chen, 2007, 2009). This strategy has been found to be very effective for online students because it helps them to develop their social networks in both physical face-to-face and cyber meetings.
Mode 8
Teachers are participating both in physical classrooms and in cyber classrooms. Students are participating in cyber classrooms only (Figure 10).

Application scenarios
A typical example of this mode was a teacher teaching an online course for students in a cyber classroom by linking other teachers in external locations with a physical learning venue, resources, or situated contexts. An example is a museum or educational centre at a zoo. A potential application could be a reporter/explorer entering a real scene to film what is happening and then providing live streaming back to the cyber classroom (Chen, Kinshuk, & Wang, 2007).

Mode 9
Teachers are participating both in physical classrooms and in cyber classrooms. Students are participating both in physical classrooms and in cyber classrooms (Figure 11).

Application scenarios
This is the most holistic mode in the proposed blended synchronous learning model. The applications can be any combination of all previously described examples. Students can freely choose to participate in a cyber classroom or a physical classroom and the same can apply for teachers. Teachers can conduct synchronous sessions either alone or with a group of teachers from different countries to form a collaborative teaching team. Students can participate alone from home or with a group of peers from multiple physical locations (Chen et al., 2007). Multiple educational institutions can align themselves strategically to recruit top faculty members from around the world and offer the best international degree programmes for students. This mode has the potential to become a mainstream model for running a successful cyber university – ‘the University of the Future’.
Empirical case study

In this section we describe an international collaboration between two educators involving two institutions from two countries in the Asia-Pacific region. It demonstrates how a single collaboration developed into six teaching–learning networks with follow-on benefits for many. The collaboration consisted of a trial of online synchronous teaching and learning via the Internet that commenced in 2003 between Megan Hastie at Brisbane School of Distance Education (BSDE), Queensland, Australia and Professor Nian-Shing Chen of the National SunYat-sen University (NSYSU), Taiwan. Data were collected over a five-year period in which the performance of several hundred students aged from early childhood to tertiary level was quantified. The collaboration was supported by the BSDE administration that recognised the value in teachers and students using the full suite of synchronous technologies available on the Collaborative Cyber Community (3C) platform at NSYSU.

The students in the trial group were enrolled at BSDE and were unable to access a physical school for various reasons including geographical isolation, special educational needs, medical exemption and family commitments. Some students lived overseas as expatriates in a range of locations including Asia, Europe, and the USA. Others were travelling within Australia and overseas with their families. Others chose to home-school in order to cater for medical and special educational requirements. All students were isolated geographically, socially, and educationally. Their physical isolation and the costs associated with traditional distance education modes resulted in limited communication with their teacher and their school. Through access to the synchronous cyber classroom students who had traditionally been ‘under-serviced’ gained direct access to their teacher, their school community, and wider social networks. All participants were issued with an individual username and password to enter the synchronous cyber classroom. The tools available in the synchronous cyber classroom enabled students to see, to hear and to speak with their teacher and other students while encoding and decoding information using visual, auditory and kinaesthetic functions. We now describe the six teaching–learning networks that developed as a result of the collaboration.
**Teaching–Learning Network 1**

Teaching–Learning Network 1 consisted of one teacher and one student at different sites. The teacher was located in a physical school (BSDE) in which a desktop computer became a virtual classroom (3C). The student was located in a physical classroom (at their home computer) that transformed to a virtual classroom upon entry to the synchronous cyber classroom. The teacher opened the synchronous cyber classroom and facilitated the lesson providing a mix of direct instruction and spontaneous interaction through content that was negotiated with the student and parent (home tutor). In some instances the teacher and student shared the same time-zone, but in others an adjustment was made to accommodate time-zone difference. For example, students in the USA joined at 4:00 pm for a lesson at 11:00 am Australian Eastern Standard Time, while students in Asia were easily accommodated due to the two-hour time difference. This configuration was used in the early stages of the trial to provide highly individualised, intensive lessons. This configuration enabled the teacher and student to develop their mastery of the tools in the synchronous cyber classroom. An adaptation of the one-to-one configuration occurred when a parent (home tutor) joined the lesson to team-teach or discuss their child’s progress with the teacher. Teaching–Learning Network 1 exemplifies how collaboration can set the foundations for a research project that resulted in educational and social gain for individual students and their parents (home tutors).

**Teaching–Learning Network 2**

Teaching–Learning Network 2 consisted of one teacher and multiple students at multiple sites. This configuration was used in the later stages of the trial to provide small-group lessons and to develop social networks amongst the students. The teacher was located in a physical school (BSDE) in which a desktop computer became a virtual classroom (3C). The students were located at home computers that transformed into virtual classrooms in the ski fields of Lake Tahoe and on yachts on the Great Barrier Reef. The teacher hosted the lesson with the interaction between the students resulting in increased negotiation of lesson content. On some occasions the teacher and student shared the same time-zone. In others an adjustment was made for students living overseas. For example, the students on the yacht in Queensland waters shared the same time-zone as the teacher but an adjustment was made to accommodate the students in the USA. The use of this configuration was favoured by school administrators as it demonstrated time and cost efficiencies. Teaching–Learning Network 2 exemplifies how collaboration can enable time and cost-efficient education programmes to be delivered to geographically dispersed students.

**Teaching–Learning Network 3**

Teaching–Learning Network 3 consisted of one teacher and one student and a group of 15 teachers at three sites. This configuration was used to provide professional development for the teachers. The student assisted the teacher in demonstrating the educational applications and the tools of the synchronous cyber classroom. The teacher was located in a physical school (BSDE) in which a desktop computer became a virtual classroom (3C). The student was located at home (USA) and the teachers were located within a physical school with access to the virtual classroom via desktop
computers. The teachers shared the same time-zone with time-zone adjustments for the student accommodated. Teaching–Learning Network 3 exemplifies how collaboration can enable professional development for teachers with follow-on benefits for multiple students and communities.

**Teaching–Learning Network 4**

Teaching–Learning Network 4 consisted of one teacher, a team-teacher and a group of 14 parents at multiple sites. This configuration was used to provide professional development for members of the BSDE Parents and Citizens Association. The parent group had asked for an update on the trial and a demonstration of the synchronous cyber classroom. The teacher was located in a physical school (BSDE) in which a desktop computer became a virtual classroom (3C). The parents were located at various sites in Queensland including rural and remote locations. Some used dial-up connections and others used satellite links. The team-teacher was located overseas (Taiwan) with time-zone adjustments accommodated. The teacher and parent group shared the same time-zone. Teaching–Learning Network 4 exemplifies how collaboration can enable professional development for parent and community groups with subsequent benefits for multiple students and communities.

**Teaching–Learning Network 5**

Teaching–Learning Network 5 consisted of one teacher and one team-teacher (project leader in the Solomon Islands) and a group of teachers and community members at three sites. This configuration was used to provide professional development for teachers and community members in a developing nation in the Pacific. The teacher was located in a home office in Brisbane, Australia. The team-teacher was located in a village in the Morovo Lagoon region in the Solomon Islands. The villagers had recently gained access to the Internet through the installation of a satellite dish. The teacher and the team-teacher worked collaboratively to provide a demonstration of the synchronous cyber classroom. The two-hour time-zone difference between Australia and the Solomon Islands was easily accommodated. Teaching–Learning Network 5 exemplifies how collaboration can enable professional development for teachers and community members in developing nations with follow-on benefits for multiple students and communities. More significantly it highlights the role of collaboration in bridging the digital divide in the Asia-Pacific region.

**Teaching–Learning Network 6**

Teaching–Learning Network 6 consisted of one teacher and one team-teacher and multiple participants at the International Conference on Advanced Learning Technologies (ICALT 2007) held in Japan. All conference participants were at the same site and shared the same time-zone. The teacher and the team-teacher collaborated in a presentation of research findings from the BSDE and NSYSU trial of synchronous technologies to peers from the international academic community. Teaching–Learning Network 6 exemplifies how collaboration can enable the exchange of educational research within the wider academic community with subsequent benefits for
educational policy makers, teachers, students and communities. It also exemplifies the role of collaboration in the development of global academic networks.

In summary, the collaboration described above is an example of how a single collaboration can have substantial follow-on benefits for many when human and digital resources are shared and developed in strategic alliances and coalitions.

The benefits of international collaboration included:

- Educational and social gains for students.
- Support for the parents (home tutors) of students.
- Educational and professional gains for teacher participants.
- Economic gain for schools, institutions and governments.
- Professional development for other teachers.
- Aid for developing nations.
- Academic publications and international acknowledgement.
- Inclusion in international educational networks.

While the collaboration was first and foremost a means for the teacher to use a technological tool to communicate with isolated students, there was significant educational gain for the students involved in the trial. This was quantified through enhanced cognitive function and inclusion in socially networked learning communities. In particular the students demonstrated higher concentration, motivation and retention of concepts. These gains were consistent in learners across the entire age range from early childhood to tertiary level.

The collaboration identified significant benefits for educators and those charged with policy decisions relating to the use of synchronous cyber technologies in education. The research undertaken during the trial documented technological and instructional design issues associated with synchronous cyber classrooms, contemporary trends in the use of technology for social networking amongst students, and the nature of the interactions in the synchronous cyber classroom when there are multiple participants from multiple locations and multiple time-zones (Hastie & Chen, 2007). This research has withstood the scrutiny of peers and has been acknowledged within the international academic community.

Findings and discussion

The proposed BSLM contains nine different modes derived from five basic elements comprising the cyber classroom, the physical classroom, the teacher, the student, and a number of classrooms or participants. Mode 9 was found to be the most holistic because students and teachers could freely choose to participate in a cyber classroom or a physical classroom, teachers could conduct synchronous sessions either alone or as part of a collaborative team-teaching arrangement, and students could participate alone from home or with peers from multiple physical locations. Multiple educational institutions could align themselves strategically for recruitment of faculty members from around the world to offer the best international degree programmes for students. Mode 9 was described as having the potential to become a mainstream model for running a successful cyber university and is envisioned as ‘the University of the Future’.

The empirical case studies described how a single collaboration between two educators was developed into six teaching–learning networks. The collaboration
consisted of a trial of synchronous online teaching and learning via the Internet and resulted in educational and social gains for students across the entire age range from early childhood to tertiary level as quantified by higher and longer concentration, motivation and retention of concepts, support for the parents (Home Tutors) of the students, educational and professional gains for teacher participants, economic gain for schools, institutions and governments, professional development for teacher colleagues, aid for developing nations, academic publications, international acknowledgement, and inclusion in international educational networks. There are five findings and/or implications that can be drawn from the study.

First, there was an imperative for the teachers in each case study to provide instruction to a range of students in various physical and cyber locations to enhance their educational, social, and economic prospects. The programmes were performance oriented and aimed at achieving standards of learning outlined in curriculum guidelines and policies. The development of ‘habits of mind’ in students, and the need for overall management of learning by responsible experts indicate how the potential of distributed resources available on the Internet platform can transform the learning experience.

Second, because the case studies relied predominantly on the use of digital technologies such as the synchronous cyber classroom and Web 2.0 resources as the mode of delivery, it is apparent that professionals in the learning industries need new mindsets and skill sets for the development of specific digital pedagogies. The case studies illustrate that these learning environments are not anarchic but they do require new ways to do new kinds of learning.

Third, the case studies show that collaborative educational arrangements in places like the Asia-Pacific region are mutually beneficial. There is a strong signal in this work that there are new opportunities not just for market share concerns, but also for realising the value that social networking can deliver for global education.

Fourth, it is clear that collaborations work best when they are supported within the infrastructure of the organisations. Support from politicians, administrators, teachers, students, parents, communities, private-sector interests, and information technology personnel provide the architecture for digital collaboration in the learning industries. Having commitment to a shared vision provides better prospects for utilising human, financial, and technological resources that are otherwise fragmented in silo-like operations.

Fifth, the experiences offered by the case studies relied on a fundamental shift in focus from internal collaboration to collaborations between organisations. A prerequisite of successful international alliances and coalitions is the capacity of teachers and teams to work across boundaries to achieve more effective delivery of services and outcomes for students. A strong implication is that managers especially need the room to innovate and to take risks that in a command-based organisation would not be acceptable.

A comparison of advantages and limitations of the proposed BSLM model is provided in Table 2.

Conclusion
A holistic BSLM is proposed to offer educators a systematic framework for conducting educational international collaborations using different combinations of physical classroom and synchronous cyber classroom. Six case studies implementing some of
the modes were used to describe specific pedagogical approaches that have been developed to show the real applications of this model. The authors have developed specific pedagogies through a range of collaborative arrangements that maximise the performance of learners by using advanced synchronous learning technologies. A further implication is that the risk-aversion so typical of mature education systems and agencies and the lack of understanding about changing geopolitical boundaries are fatal for the kinds of development described in the paper.

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References