Designing a Collaborative Learning Space using Pedagogical Principles: The National Institute of Education's LearningHub@LIBRIS Revisited

Isabel Yeo-Tang I-Sha
Douglas Lau Chin Tiong
Hilary Ho Oon Seng
Library and Information Services Centre
National Institute of Education (NIE) Singapore

Abstract

When libraries redesign their spaces, it is now fashionable to incorporate information commons, cafés and multimedia laboratories into their plans. As the library of the only teacher training institution in Singapore, NIE Library and Information Services Centre (LIBRIS) naturally drew its inspiration from pedagogical principles when it redesigned part of its new library at the Yunnan Gardens campus. This paper examines the rationale behind the design of the LearningHub as a collaborative learning space and evaluates the impact of the LearningHub since its opening five years ago. It discusses the following areas: pedagogical principles that inform the design, impact of the LearningHub on stakeholders and future plans for the expansion and upgrading of the LearningHub. This article was presented as a paper at the LAS Conference in May 2008.

Introduction

The National Institute of Education (NIE) is the sole teacher training institute in Singapore for pre-service teacher preparation and a major provider of in-service professional development. It is an autonomous institute within the Nanyang Technological University. It has an enrolment of about 5,600 full-time equivalent students in more than 30 programmes spread over various fields of study in education. There are about 400 academic staff members (National Institute of Education, 2007). The vision of NIE is to be an "Institute of Distinction" and its mission is to excel in teacher education and educational research.

Founded in 1950 as a Teachers' Training College Library, the NIE Library and Information Services Centre (LIBRIS) is the largest education library in Singapore. LIBRIS provides resources to support the teaching and research programmes of the Institute. LIBRIS also reaches out to meet the needs of education professionals in the Ministry of Education, schools and related organisations.

As part of this mission, the LearningHub@LIBRIS was officially launched on 28 September 2002. It was the first of its kind to be set up in an academic library in Singapore. It was specially devised to provide an environment that is conducive and promotes information sharing and a collaborative learning culture in NIE.

Specifically, the LearningHub was designed to meet four main objectives:
1. Provide a conducive environment to enhance collaborative learning and face-to-face interaction among staff and learners
2. Provide LIBRIS users with an access point to digital and multimedia resources
3. Provide alternative means (via a different type of space from the conventional classroom) of promoting teaching and learning interactions, knowledge dissemination and sharing
4. Foster a life-long learning spirit among educators in Singapore

Components of the LearningHub

Located in the Left Wing on Level 3, the LearningHub, and indeed the entire library, is a wireless environment. The facilities in the LearningHub are:

1. The SMART (Sharing, Multidisciplinary, Autonomous, Reflective and Technology-enabled) Room
2. The Main Lounge with Plasma Monitors and Focus Speakers
3. The Staff Lounge
4. The Lifestyle Café
5. Seating areas in the café around a centrepiece display
6. Automated Disc-Dispensing Machine – LIBRIS has the only Automated Disc-Dispensing Machine (ADM) in a Singapore library. The ADM is a self-service machine for borrowing and returning of library resources in disc format.

(See Appendix 1 for the layout of the LearningHub and our website for photographs http://www.acis.nie.edu.sg/nie-acis/library/floorplan3/learninghub.do).

Some events/programmes that have been held at LearningHub@LIBRIS include:
> Lectures, tutorials and talks
> Book launches and book donation ceremonies
> Prize presentation ceremonies
> Briefings for visitors
> Library instruction and library orientation for course participants

The following sections discuss the basic principles of collaborative learning and how the LearningHub was planned based on these principles to enhance collaborative learning.

Collaborative Learning

The global shift towards high-technology and information-based economies has placed a premium on workers who are equipped with interpersonal, communica-

tion and problem-solving skills. This has re-awakened the interest of educators in the practice of collaborative learning. Collaborative learning may be defined as students working in small groups to achieve shared learning goals (Barkley, Cross, & Major, 2005). It is rooted in the assumption that knowledge is socially constructed by consensus among peers (Vygotsky, 1978). When students bring their experiences and ideas to the intellectual conversation, the understanding of other participants is enriched, resulting in active learning.

As it is not the intention of this paper to discuss the theory and research of collaborative learning, no distinction will be made between collaborative learning and cooperative learning. They will be treated as synonymous with each other and with terms such as group learning and peer tutoring.

Johnson, Johnson & Smith (1991) described the five basic elements of collaborative learning. They are listed below in decreasing order of the extent to which they have important implications for the design of the LearningHub:

Face-to-face promotive interaction
Students engage in dialogue and work together actively towards stated objectives. They learn from other students those concepts that are beyond their current level of understanding.

Interpersonal and small group skills
Social skills are key to cooperative productivity. Collaborative skills include leadership, trust-building, communication and conflict-management skills.

Group processing
Groups need to reflect on their progress towards achieving their goals and to evaluate the effectiveness of their teamwork.

Positive interdependence
Students perceive that their own success depends on their group members achieving success. This leads to the whole group working towards maximizing the learning of all members.

Individual accountability
The performance of each individual student is assessed. Each student is responsible for doing his/her share of the group's work.

The advantages of group learning are well-documented in the literature. Cognitive-academic and social-emotional benefits range from the development of critical thinking and problem solving skills to interpersonal skills (Barkley et al., 2005). Slavin (1995) reported that by adopting cooperative learning approaches, student achievement is significantly positive; there was also increased self-esteem, acceptance of academically less able students and improved inter-group relations. Johnson & Johnson (1999) noted that students displayed more frequent higher-level reasoning, deeper-level understanding, and greater motivation to learn; they also enjoyed greater psychological health, adjustment and well-being, and developed greater social competencies. Therefore, collaborative learning would be able to offer students success not only in school but also in the work world by equipping them with the soft skills and mindsets that employers value.

LearningHub as Collaborative Space

As Wilson (2002) puts it so succinctly, "Collaborative learning requires collaborative space". The LearningHub@LIBRIS was designed with the general aim of advancing the mission of the NIE and with the specific aim of facilitating collaborative learning. It offers physical space to foster interaction, conducive environment to encourage dialogue, infrastructure to support research on the web and well-equipped areas to conduct classes in.

However, it must be pointed out that the LearningHub is not strictly an information commons, by which is generally meant "a specific location designated to deliver electronic resources for research and production that is maintained by technically proficient staff" (Cowgill, Beam, & Wess, 2001, p. 432). It was never planned as a one-stop centre that integrated traditional reference service with computer workstations. Instead, when designing the LearningHub, LIBRIS focused on developing the space for group collaboration. Group collaboration would be considered by librarians as the most important aspect of an Information Commons (Whitchurch & Belliston, 2006). This was in keeping with the significant trend, as noted by McDonald (2006), of libraries providing social and collaborative spaces for users to interact with each other.

How LearningHub supports Collaborative Learning

As the library of the only teacher training institution in Singapore, LIBRIS naturally drew inspiration from the pedagogical principles of collaborative learning when planning the LearningHub. In collaborative learning, the social experience that educates is the constructive conversation (Bruffee, 1999). Therefore, through the LearningHub, LIBRIS seeks to provide members of the NIE community with the space in which to construct knowledge as they talk together and reach consensus. Research at Harvard has shown that "students who get the most out of college, who grow the most academically, and who are happiest, organise their time to include interpersonal activities with faculty members, or with fellow students, built around substantive, academic work" (Light, 1992, p.6). The LearningHub provides the physical environment that will help nurture strong relationships among students, as well as between students and staff, thus enabling student learning, and leading to a fulfilling NIE experience.

This section of the paper examines the individual components of the LearningHub and how their physical layout and equipment encourage collaborative learning.

SMART Room

The SMART (Sharing, Multidisciplinary, Autonomous, Reflective and Technology-enabled) Room is equipped with a SMART Board (a touch screen interactive teaching board with computer and audio-visual capabilities), and other state of the art multimedia equipment.

Lecturers use the SMART Room for small group tutorials and student presentations. The SMART Board displays visuals from DVDs, videotapes, computer applications (e.g. Word, PowerPoint) and the Internet. When students see the equipment that is

inside the room, they sometimes request their lecturer to book it for them and return to use the SMART Board to rehearse their presentations.

The constructivist approach to learning calls for flexible seating arrangements. The tables in the SMART Room have a curved kidney shape that allows them to be lined up in rows for a traditional presentation or arranged in clusters for group activities. The tables stand on castors which allow them to be shifted about with a minimum of effort and noise.

The SMART Board's capability of displaying 'live' Internet images offers students the opportunity to address real-world issues and engage in face-to-face dialogue with each other as well as with online communities, both local and foreign, synchronously or asynchronously. Learners therefore play active rather than passive roles.

The SMART Room offers a multi-sensory experience that will develop multiple competencies, e.g. negotiation skills, presentation skills, technological skills. It is thus designed to support multiple modes of learning such as discussion, presentation and reflection. Its highly versatile set-up can be easily adapted for various activities to promote collaborative learning.

The Main Lounge

The Main Lounge can be used for informal small group discussion or as a classroom with heavy curtains drawn to cordon off the area, transforming it into a mini theatre.

During busy periods, patrons from the adjoining café may bring their snacks and drinks inside the lounge to escape from the bustle. Furnished with sofas and low coffee tables, the Main Lounge offers a comfortable and cosy ambience for relaxation. Sometimes, lecturers use the large plasma monitors in the lounge to screen movie clips from DVDs or videotapes, after which students break up into groups for discussion. In this way, the lounge provides an informal, less rigid atmosphere for lessons.

Education being a social process that occurs through interpersonal interaction among students, and between the lecturer and students (Johnson, Johnson & Smith, 1995), the lounge helps the lecturer to create conditions in which students may exchange ideas and engage in active learning with their peers through debate and inquiry. Here, students can also interact with information from outside the classroom and construct meaning from the material presented.

Thus, the Main Lounge satisfies the three characteristics of new learning spaces: it incorporates new technology, creates new patterns of social interaction and of intellectual interaction (Mitchell, 2004).

The Staff Lounge

The Staff Lounge is a quiet corner set aside for staff discussion and brainstorming over coffee. It is a distraction-free zone where staff may settle in plump couches and armchairs for a quiet read or a quick powwow especially when the café gets overcrowded. There are no disruptions from the beeps of electronic gadgets or the chink of crockery. The lounge has a central cabinet with doors that perform double duty as writing surfaces for the recording notes using whiteboard markers during discussions. As McDonald (2006) accurately

pointed out, library interiors have become more like an extension of the living room, providing the emotional space for social interaction within the academic community.

The Lifestyle Café

The Lifestyle Café was opened on 21 July 2003. It is an important part of the LearningHub@LIBRIS and serves gourmet coffee, delicious cakes and a range of delightful beverages and snacks at affordable prices.

The café is a spot in the library where students and staff gravitate to, drawn by the aroma of freshly brewed cappuccino. Group study also seems to induce an appetite for snacks and coffee, perhaps explained by the stimulating effect of caffeine on thinking.

There are four types of seating arrangements to suit different activities/users: round tables for group work, diner-style long tables for group activities, sofas for small group discussions and counters for lone users. These arrangements underline the collaborative learning philosophy that emphasizes the voice and contributions of all participants. Based on the principle that learning is social, the majority of the tables are round so as to encourage interaction and dialogue among participants. The long tables are rounded at one end so users may collaborate sitting in a U-shape formation. The tables are suitable for project-based activities as they provide sufficient space for laptop computers, books and writing materials. The seats by the windows look out on to a stunning panorama of lush greenery, providing a soothing vista for café patrons.

Electrical outlets and LAN ports are plentiful. Café patrons may power up their laptop computers to search electronic databases or do their research on the web through wireless network access. Information is instantly retrieved with no interruption to the face-to-face interaction, which may even run parallel to an online discussion.

Laptop security is an important issue in such a busy area. Therefore, anti-theft security anchors have been installed beneath tables and counter tops for users to attach their laptops.

One of the qualities of a good library space is the suitability of the environment for users (McDonald, 2006). This quality is especially important to the café as it is the only component of the LearningHub that is adjacent to the floor-to-ceiling glass windows of the library building. To overcome the potential problem of exposure to the heat and glare of the tropical sun, sun screens are raised or lowered automatically when light sensors are stimulated. This feature reduces electricity consumption for air-conditioning and lighting, leading to smaller electricity bills and a greener environment.

Evaluation of the Impact of LearningHub on Stakeholders

As we pass the five-year milestone on the LearningHub's journey, it is an appropriate juncture at which to evaluate the impact of the LearningHub on the NIE community. Feedback was solicited in two ways: a questionnaire was administered to a group of 25 participants in an in-service programme while an e-mail survey was

sent to teaching staff. (See Appendix 2 for the questionnaire).

The questionnaire was designed to gauge users' experience of collaborative learning activities in the Library before the LearningHub was set up (old Bukit Timah campus library) and after it was set up (current Yunnan Gardens campus library). The sample consisted of respondents who were senior serving teachers and who would have attended their pre-service teacher training at the old Bukit Timah campus. They would therefore have made use of the old library and would be in a position to make a comparison of the two libraries.

The e-mail survey was sent to randomly selected teaching staff to obtain their feedback on how the LearningHub has changed their teaching and research.

The questionnaire contained ten questions, constructed to cover three aspects considered important to a collaborative space–technology, ambience and victuals–as well as to confirm the respondents' overall impression of the two venues' suitability for collaborative learning. (See Table 1).

Table 1: User Feedback on how well the past and present NIE Libraries Support Collaborative Learning

No.		In the Bt Timah Campus Library		In the Present NIE Library	
		Yes	No	Yes	No
	Technology				
3	Allows surfing of the Internet and eating/drinking at the same time	0.0	100.0	100.0	0.0
5	Hi-tech equipment is accessible	5.3	94.7	100.0	0.0
	Ambience				
6	Collaborative space is comfortable	61.1	38.9	96.0	4.0
7	Collaborative space is aesthetically pleasing	27.8	72.2	96.0	4.0
8	Collaborative space is accessible	52.6	47.4	96.0	4.0
10	Furniture arrangement is flexible	5.3	94.7	95.8	4.2
	Victuals				
1	Convenience in getting a quick bite or drink	31.6	68.4	100.0	0.0
2	Beverages & snacks are of good quality	47.4	52.6	96.0	4.0
	Overall Impression				
4	Suitable for brainstorming/discussion	68.4	31.6	100.0	0.0
9	Collaborative space encourages interaction and participation	36.8	63.2	96.0	4.0

1. Technology

Questions 3 and 5 sought to elucidate users' views on the accessibility of technology in the two libraries. 100% of respondents did research using online resources in the LearningHub and 100% felt that high-tech equipment is accessible in the LearningHub as compared to 0% and 5% respectively in the old campus library.

The technological equipment in the LearningHub was also well-received by the teaching staff:

"I am a big fan of the SMART Board and the possibilities it allows us to collaboratively view and edit Word files... The video/DVD features behind the café have been very useful..."

"We were also impressed with the new IT facilities in [the LearningHub]."

"We have found... the SMART Board to be simply a great tool for brainstorming, surfing, note-making, and more... Sometimes, I show them video clips as a stimulus for discussion and the plasma TVs come in handy."

2. Ambience

Questions 6, 7, 8 and 10 sought to discover how users felt about the ambience of the LearningHub. The figures in parentheses are the percentages of participants (LearningHub vs. old campus library) who felt that the LearningHub is: accessible (96% vs. 53%), comfortable (96% vs. 61%) and aesthetically pleasing (96% vs. 28%). In addition, 96% felt that the furniture arrangement in the LearningHub is flexible and modular while 5% felt the same way about the old library.

The teaching staff seemed to concur with the findings of the survey, commenting that: *"[The space behind the café allows] small group discussion in a more comfortable environment than a tutorial room or classroom..."*

"The atmosphere on that floor lends itself much better to small group communication in research discourse."

3. Victuals

Another important feature of library collaborative spaces is the 'food for thought'. Questions 1 and 2 asked respondents for their views on this issue. With regards to the LearningHub, 100% felt that it was a convenient place to get a quick bite or drink and 96% felt that the quality of beverages and snacks is good. This is compares favourably with 32% and 47% respectively for the old campus.

Similarly, food-wise, the teaching staff have found the LearningHub appealing.

"The staff lounge is invaluable as it provides a place for us to have meetings and of course a good cup of coffee from the café."

"In this corner of the library, where the aroma of latte lingers tantalizingly, planning our lessons seems to be less of a formidable task."

4. Overall Impression of Suitability as Collaborative Space

Questions 4 and 9 sought to discover how users' need for a collaborative space was met by the LearningHub and the old Bukit Timah campus library. 100% of respondents agreed that the LearningHub was suitable for brainstorming/discussion as

opposed to 68% who felt that the old Bukit Timah campus library was suitable. 96% felt that the LearningHub encouraged interaction and participation. This is in contrast to 37% who felt the same way about the old library. Thus, about 30% more respondents considered that the LearningHub is a more suitable collaborative space than the old campus library.

These results from students were corroborated by comments from academic staff:

"[My students] have... even turned [the LearningHub] into a mini-art gallery for our art and culture unit."

"I like the synergy and vibrancy that I see and feel in [the LearningHub], and especially when I see staff interacting with students here."

"Somehow, the Hub breaks down the barrier between staff and students."

On the whole, more than 95% of respondents gave favorable reactions to various aspects of the LearningHub. Thus we can see that the LearningHub has greatly improved staff's and students' perception of and satisfaction with the library. Since the LearningHub was set up five years ago, a user community has quickly developed around it. The following quotes best sum up users' attachment to the LearningHub:

"...[The LearningHub] is an absolute necessity and students and staff use it to the maximum."

"In short – it is hard to imagine life at NIE without the LearningHub at LIBRIS!"

Conclusion & Future Plans for LearningHub

As noted by Johnson and Lomas (2005), "designing a learning space is an organic and iterative process that continues long after the space is complete" (p.28). Improvement of the LearningHub is therefore never finished; it is dependent on accurate and on-going monitoring and assessment.

LIBRIS continually monitors the use of the LearningHub in order to ensure its continued relevance to the mission of NIE. One of the pillars of NIE's strategic plan for the future is to be able to meet the needs of its stakeholders. To meet the demands of the projected increase in enrolment, plans are in the pipeline to expand the LearningHub and to increase the number of seats.

The needs of academic staff will not be neglected. Our staff were forthcoming with suggestions as to how the LearningHub may be improved. For example, a suggestion to support teleconferencing in the SMART Room, using Skype to allow lecturers and students to collaborate with members of overseas institutions through telephone/video conversations over the Internet has been accepted and implemented. We look forward to more developments and improvements in the future in tandem with the needs of lecturers and students.

Johnson and Lomas (2005) regarded a learning space as successful if it is used in the manner that the creators envisioned, it is always busy and it supports deeper

learning. Judging by their criteria, the LearningHub may be deemed to be an unqualified success. Results of the survey and comments from teaching staff reinforce this belief. Much of its success may be traced to the considered use of the pedagogical principles of collaborative learning to inform design decisions.

To enable student learning via collaborative and other approaches, the LearningHub needs to reinvent itself and prepare for the increasing emphasis on group projects, technological shifts and specialization of students' needs. This entails discovering new uses for its space and deploying new technology to support new practices within its space. Continuous improvements like these will no doubt take NIE a step closer towards realising its vision of becoming an "Institute of Distinction".

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About the Authors

Isabel YEO–TANG is Head, Library and Information Services Centre, NIE since 1994. During her 30+ years' career as a librarian, she was Chief Librarian, Straits Times Editorial Library; Head, Ministry of Trade & Industry Library; Head, National Library's Microfilm Unit. Awarded a Colombo Plan Scholarship, she obtained her professional qualification in New Zealand in 1974. Email: isabel.yeo@nie.edu.sg

Douglas LAU is Manager, Circulation Services in NIE Library. Besides his core functional duties, he is in charge of outreach, orientation, visitorship and publicity programmes. Douglas obtained his MSI from the University of Michigan. He also holds an MBA and a B.Bus (Hons) from NTU. Email: douglas.lau@nie.edu.sg

Hilary HO is an Assistant Manager in the Reference Section of NIE Library. He plans and coordinates instructional and outreach programmes, develops digital resources and provides information services. Hilary obtained his MSLIS from Drexel University on a Dean's Fellowship. He also has 20 years of experience teaching in a junior college.
Email: hilary.ho@nie.edu.sg

Appendix 1: Layout of LearningHub@LIBRIS
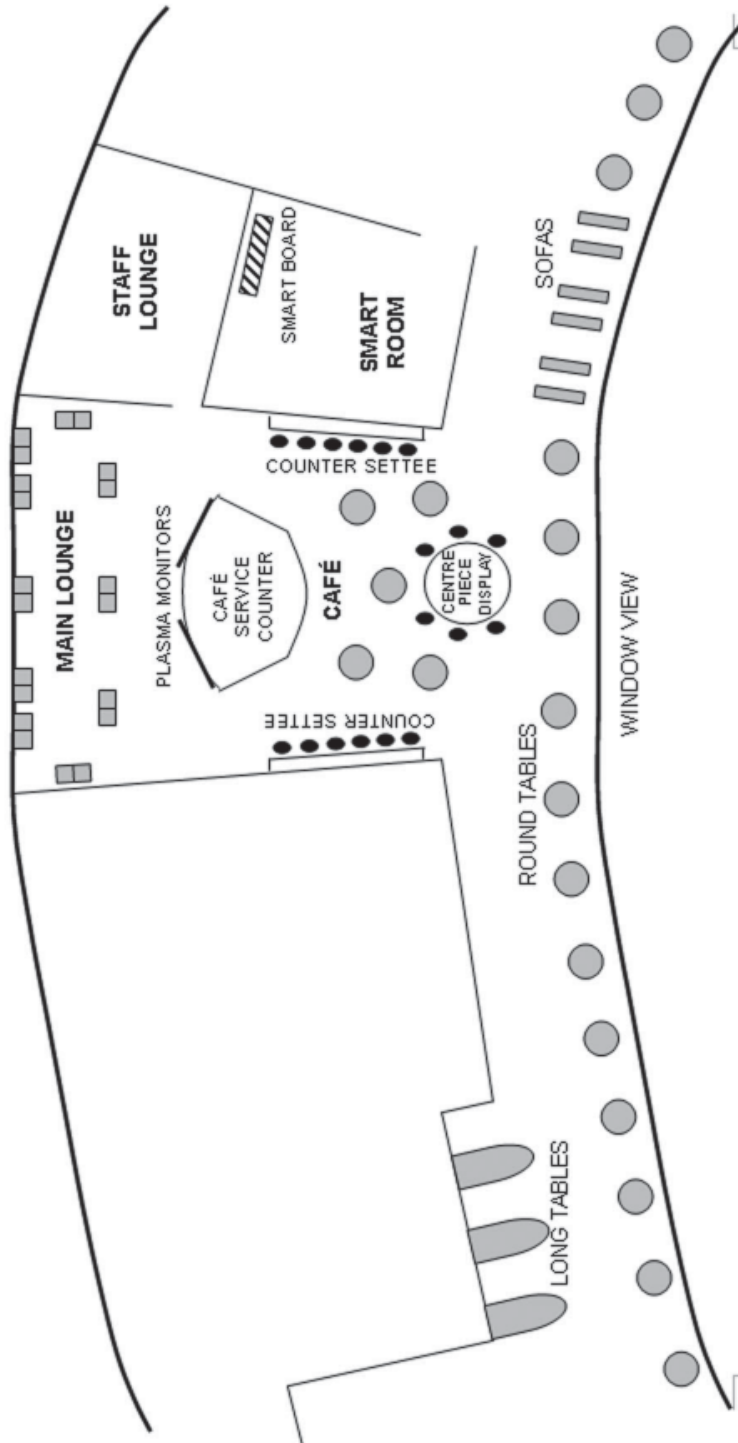
Appendix 2: Survey on NIE Library: Pre- and Post-Learning Hub

We are conducting a survey to gauge the impact of the LearningHub@LIBRIS on our library users. We would appreciate it if you could please spare a few moments to fill out the questionnaire. Thank you.

Please circle Y for 'Yes' or N for 'No':

No.	Item	In the Bt Timah Campus Library	In the Present NIE Library
1	Convenience in getting a quick bite or drink	Y / N	Y / N
2	Beverages & snacks are of good quality	Y / N	Y / N
3	Allows surfing of the Internet and eating/drinking at the same time	Y / N	Y / N
4	Suitable for brainstorming/discussion	Y / N	Y / N
5	Hi-tech equipment is accessible	Y / N	Y / N
6	Collaborative space is comfortable	Y / N	Y / N
7	Collaborative space is aesthetically pleasing	Y / N	Y / N
8	Collaborative space is accessible	Y / N	Y / N
9	Collaborative space encourages interaction and participation	Y / N	Y / N
10	Furniture arrangement is flexible	Y / N	Y / N

If you have any other comments on how the LearningHub has affected your study/ collaborative activities or have any suggestions for improvement, please feel free to share them with us in the space below: