Outcome-based Higher Education for Developing Knowledge-based Procedures in Students

keynote address

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Sajeewanie D. Somaratna
Acting Librarian, University of Colombo
sajees@lib.cmb.ac.lk

Introduction

I am now a university librarian, after having done a Science honours degree. As a librarian, I recognized the limited ways in which libraries were contributing to the development of student skills. Faced with this situation, I had two options: either conform to the traditional library model or work towards changing it.

I chose the latter and would like to share how I transformed the Science library of the University of Colombo and the skill-based procedures it now offers to our Higher Education (HE) students.

In the library I designed and currently work in, we call the Information & Learning Centre (ILC). Let's take a closer look at what our ILC offers.

Let's consider the traditional way of searching for a catalogue in other libraries. In the ILC, we have implemented a different approach and our online catalogue/ Online Public Access Catalog (OPAC), provides a user-friendly interface that allows students to search for books, resources, and information efficiently. This encourages and develops information literacy and search skills in our students.

When talking about borrowing books, traditionally, books are issued through a library staff at an issue desk. However, in the ILC, we have empowered students to issue books themselves. This fosters a sense of self-reliance and independence among students, developing a valuable skill procedure.

Unlike the traditional library, where silence is strictly maintained, the ILC encourages and provides spaces for discussions. We understand that discussions can lead to various skill procedures such

as deep learning, oral communication, interaction, engagement, critical thinking, collaboration, and leadership. By offering a platform for open dialogue and exchange of ideas, we aim to cultivate these important skills in our students.

Overall, the Information & Learning Centre (ILC) goes beyond the traditional library model, by incorporating innovative approaches to develop essential skills in Higher Education students.

By emphasizing information literacy, self-reliance, and fostering an environment of discussion, we are motivated to equip students with the necessary tools to succeed in their academic journey and beyond.

So, let's go on and see, why this sort of "Outcome' is necessary in today's HE and world, and why did I design the ILC in this way.
This is because I aimed at what you have heard as OBE....and the student skills that we need to develop as "outcomes".

When moving back to our conference theme toady,
“Outcome-based Higher Education for Developing Knowledge-based Procedures in Students”
I would like to share these aspects with you.

- Outcome-based education
- Changes in the environment
    - IR4
    - Education 4.0
- Identifying the learner
- Developing knowledge-based procedures in students outside the classroom environment
- Providing learning spaces for today’s learner
- Evidence for practicing knowledge-based procedures in the Science Library – my experience
- Promoting knowledge-based practices within your university or institution

Outcome-Based Education (OBE)
Outcome-Based Education (OBE) has emerged as a prominent principle in today's higher education sector, and it is rapidly spreading across universities and colleges.

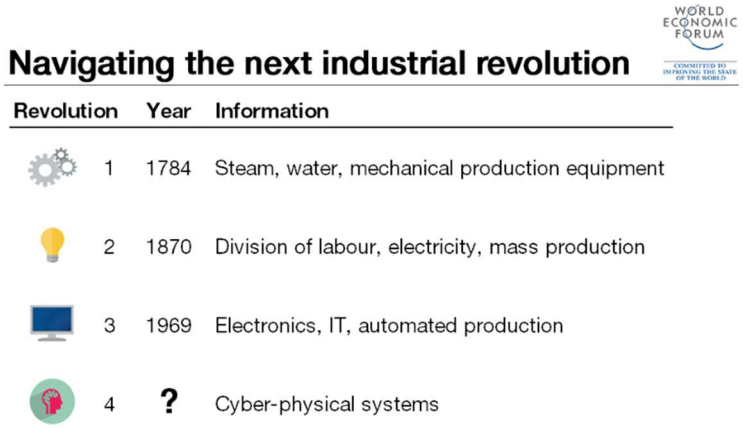
As articulated by Spady in 1994, OBE involves a comprehensive focus on clearly defined outcomes, that all students should demonstrate upon completing a program.

OBE as it stands in contrast to traditional education systems that may prioritize the process itself, often overlooking the end results and focusing on “what the students are capable of doing”.

In other words, the focus is on results-oriented thinking, rather than an input-based approach. Parallel to OBE, two major changes have been observed in our environment.

OBE and IR4

Industry 4.0 is leading a revolution in the manufacturing, improvement, and distribution processes of companies. Manufacturers are incorporating new technologies such as the Internet of Things (IoT), cloud computing, analytics, and artificial intelligence (AI) and machine learning into their production facilities and overall operations.



Source: 2023 World Economic Forum

The Fourth Industrial Revolution (IR4) is anticipated to reshape our way of life, work, and communication.
It is also likely to redefine the value we place on things and how we perceive them in the future. We are already witnessing changing business models, and employment trends as a result of this revolution.

According to the World Economic Forum, approximately 65% of children entering primary education today will eventually work in jobs that do not currently exist.

Automation and artificial intelligence are catalysts of change in the 4IR, rendering certain employee groups, redundant and replacing them either with workers possessing the necessary skills, or with cost-effective machines.

Therefore the traditional notion of attending college or university to obtain a degree that guarantees lifelong employment is fading away.

According to the World Economic Forum report, "The Future of Jobs," the following ten skills are crucial for success in the Fourth Industrial Revolution:

- Complex problem solving
- Critical thinking
- Creativity
- People management
- Coordinating with others
- Emotional intelligence
- Judgment and decision making
- Service orientation
- Negotiation
- Cognitive flexibility

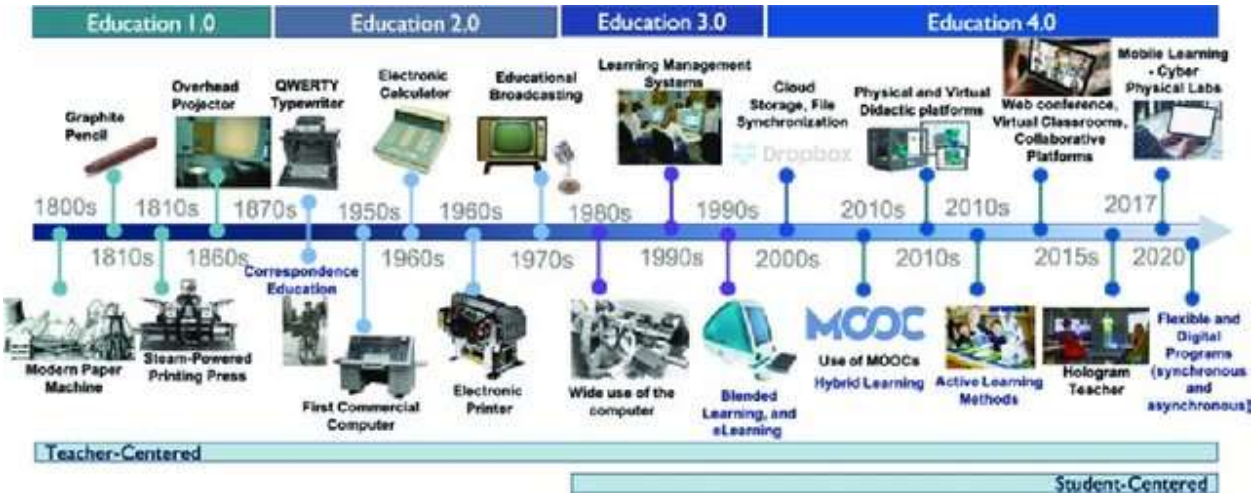
Therefore, students, today should focus on developing skills that are difficult to replicate by machines, such as creative thinking, social interaction, and physical handiness, in addition to the foundational skills required to succeed in a technologically driven world.

Parallel to IR4 entire education system has been evolved from education 1.0 to 4.0. Now we'll see what is meant by Education 4.0

Education 4.0, also known as the Fourth Industrial Revolution (IR4) education, or the digital education revolution, refers to the transformative changes in the field of education brought about by the advancements and integration of digital technologies, automation, and artificial intelligence.

Education 4.0 encompasses a shift from traditional educational models to more dynamic, learner-centered approaches that influence technology and emphasize the development of future skills.

It recognizes the need to prepare students for the rapidly changing demands of the digital age and the future workforce.



Source: Evolution of technologies and learning methods according to the four periods of Education, leading to Education 4.0-Timeline (Molina, et al, 2021)

Here are some key characteristics and components of Education 4.0

Personalized and Adaptive Learning
Digital Literacy and Technology Integration
Future Skills Development
Blended and Online Learning
Experiential and Authentic Learning
Lifelong Learning and Continuous Professional Development

Education 4.0 seeks to connect the potential of digital technologies and the Fourth Industrial Revolution to enhance learning outcomes, increase access to education, promote equity, and prepare students for the challenges and opportunities of the future.

Has our Higher Education been failing?

Even though the earlier mentioned skill needs for HE students had been identified for some time, remedial measures to change university classroom teaching from its traditional transmission model to an OBE model seem not to have become established yet.

For example, one of the persistent complaints of university teachers continues to be that, in their classrooms, their students are not engaged or interested but remain silent and passive, unresponsive to answer and ask questions.

When think about this, this question comes to my mind. “Has our Higher Education been failing?’

In contrast, we know that students chatter away outside class and in the canteen. The problem then, is not the students' inability to tell or ask (i.e. talk), but that some discomfort to talk arises when they enter the classroom.

This should show us that students are not used to readily showing their responsiveness and engagement when they are in classroom settings and on subject topics. Keeping in mind that, in the OBE model, the expanded learning opportunities such as this talking in the classroom should be progressively taken up mainly by the student rather than limited to the teacher,

if that does not happen, student skills development can be failing in HE teaching.

So, all of us here today being teachers, what can we do in our own small ways, to reduce that student classroom discomfort to talk, respond and engage?

Can some of us help to do this **inside** the classroom and others can facilitate it **outside** the classroom?

When both such inside and outside classroom help is combined, all of us will surely contribute to a much higher achievement of OBE goals in our HE.

Regarding inside-the-classroom student facilitation, from the CTHE training I received, I know that there are stepwise procedures (based on knowledge) to achieve student responsiveness and engagement, such as by using Think-Pair-Share, Minute Papers, Small Groups and so on.

But thinking further, if the students are "prepared" or 'primed' for this before they enter the classroom, it could considerably reduce their discomfort to engage inside the classroom.

So, moving on to an outside classroom setting of an academic library, what I would next show you is how, as a Science librarian, I helped to "prepare" our students to become ready for the next step of their classroom engagement.

Developing knowledge-based procedures in students outside the classroom environment

With the conference theme of 'knowledge-based procedures' in mind, let us see how we can use a procedure to get them 'used' or familiarized to show responsiveness and engagement, with a first step in a less uncomfortable non-formal setting.

If we help them to form this responsive engagement into a habit, then it can be an easy next step to use this habit in their formal classrooms.

It was with these in my mind that I thought I could contribute to change HE in my role as a librarian. One of the first steps in this procedure was to use my librarianship knowledge-base, to create non-formal 'learning spaces'.

Let me next show you how this was possible.

Providing learning spaces for today's learner

Academic libraries have a crucial role to play in creating learning centres and providing spaces that support students' learning habits beyond the formal classroom setup.

By designing different learning spaces within the library, institutions can offer students diverse environments that cater to various learning preferences and activities.

When designing the Science Faculty library of the University of Colombo we basically considered the students' informal learning activities that match with IR4 and education 4.0. Here are the specific learning spaces that are created in the Science Faculty Library, University of Colombo which match the different learning activities of the students.

Learning Activity	**Learning Space**
Collaborative learning	Collaborative study zone
Student individual learning	Quite/self-study Zone
Learning by discovery - reading and searching databases	Interactive study zone/ Reference Zone
Focused learning – research studies	Library Skill Lab
Library classroom learning – information literacy	Librarian's classroom
After hour studying	Open study zone/ Informal learning space
Auditorium facilities - Public / Campus events	Library Auditorium
Learning by Video conferencing	Library Studio
Faculty learning	Faculty Reading Room
Non-library classroom learning- taught by faculty and student activities	Non-Library Classroom

Now we'll see what are the characteristics of each learning space.

Collaborative discussion Zone: The Science Library was designed to provide designated areas that encourage student discussion through student group work discussions and collaboration. These

spaces include group study areas equipped with technology and interactive tools to facilitate teamwork and brainstorming sessions. Round study tables with comfortable cushioned chairs are chosen to facilitate collaboration among students. The furniture arrangement can be adjusted based on the size of the learning group.

Quiet Study Zone: We also offer quiet study zones where students can focus and study individually without distractions. These areas are provided with a calm and peaceful atmosphere favourable to concentration and deep learning. Individual study tables with comfortable cushioned armchairs are provided to create a favourable environment for focused individual learning.

Interactive study zone: Interactive study zone is also popular among the students and comfortable sofas and beanbags are used to create a comfortable and relaxed learning experience that promotes interaction and engagement.

Technology-Enabled Spaces: Integrating technology into our library spaces enhanced student learning experiences. Our ILC provides state-of-the-art computer labs, E-resource centres, maker spaces, Library studio or media production areas equipped with the necessary tools and software for digital projects and creative activities. The resource centres of the library consist of 110 computers while The library studio consists of modern video conferencing equipment which facilitates video conferencing and multimedia production.

Flexible Learning Spaces: We have designed flexible learning spaces that can be easily reconfigured to accommodate different learning activities is essential. Furniture on wheels, movable partitions, and adaptable seating arrangements allow students to customize the space according to their needs, whether it's for group discussions, individual research, or presentations. Library skill lab of the ILC provides this learning experience to learners with flexible study tables that can be arranged as round tables or long rows that are used to accommodate different learning activities.

Informal Gathering Areas: Also, we have incorporated comfortable seating areas and lounge spaces where students can relax, engage in informal discussions, and exchange ideas. These areas foster social interactions and unexpected learning moments. The Open/after-hour study zone of the Science Library is used for this purpose. Light-weight chairs are used at outdoor study tables, providing a suitable seating option for students studying in this space. As this is an open area on the ground floor, students can comfortably use this space experiencing the natural wind breeze. The coffee shop is located alongside this open study zone, allowing students to enjoy hot coffee while studying and providing a cozy, homelike environment for learning.

Library auditorium: A state-of-the-art auditorium is furnished with 300 modern auditorium chairs and this space is exclusively used for professional or academic gatherings of the faculty and students. They use this for conferences, talks, faculty events and student events.

Non-library classroom: This space encourages both formal and informal learning practices among students. The classroom is equipped with 300 comfortable lecture chairs with integrated writing

pads, creating a suitable learning environment for classroom-based teaching. In addition to that this space is designed as an adjustable space ideal for workshops, activities of student societies and other functions. Students actively use this space to develop their speaking skills, leadership skills, career development activities, etc. Student societies such as Rotaract Club, Gavels Club, AISAC, and FOS media use this space exclusively.

Faculty reading space: As academics, we actively engage in Continuous Professional Development (CPD) programs throughout our academic careers. To promote faculty learning, a dedicated space has been established in the Science library. I have personally witnessed academics who had never visited the library before now utilizing this space effectively for learning and research purposes.

Multimedia Resources: We provide access to a wide range of multimedia resources, including digital databases, e-books, online journals, and audiovisual materials. This allows students to explore diverse content and engage with different formats of information.

Supportive Services: In addition to physical spaces, we offer academic support services, such as tutoring centres, writing assistance, research consultations, and access to specialized librarians who can guide students in their information-seeking process. Librarian's classroom is specifically designed for this purpose. Flexible study tables are used to accommodate different learning activities in these spaces and the setup of this space is similar to the Staff Development Centre (SDC) of the University of Colombo.

Likewise, by creating diverse learning spaces within the library or academic institutions we can promote independent learning, collaboration, and innovation. These learning centres/libraries serve as dynamic environments that cater to students' evolving learning needs and empower them to cultivate effective learning habits outside the traditional classroom setting.

Creating a conducive and pleasant ambience in the learning spaces

The Science Faculty Library also recognizes the importance of creating a conducive and pleasant ambience in the learning spaces. The ambience is influenced by various factors such as sight, sound, scent, and temperature. Here are the steps taken to enhance the ambience and atmosphere in the library. By addressing these factors and paying attention to the overall ambience, the Science Faculty Library aims to create a positive and engaging atmosphere that supports students' learning and promotes a sense of comfort and focus.

Technological Adaptations in learning spaces

We have recognized the importance of technology in creating a modern and effective learning environment for students. The incorporation of various technological adaptations within each learning space is aimed at meeting the expectations of today's learners. Here are some technological facilities incorporated into the library. These are Wi-Fi facilities in all learning

spaces, state-of-the-art computers, E boards and interactive boards, multimedia projectors, sophisticated sound systems, network ports and power outlets for each study table, video conferencing system and library automation system powered by RFID technology with self-check machines. The integration of these technological facilities enables smooth transitions between different learning methods. By catering to the technological needs and preferences of students, the library aims to create an environment conducive to modern learning practices.

Evidence for practicing knowledge-based procedures in the Science Library

In reality, the Science Faculty Library shows the successful implementation of knowledge-based procedures.

The library draws in more than 500 students daily, highlighting its significance as a hub for learning and academic activities. The presence of various dedicated learning spaces tailored for specific activities ensures that students have suitable environments to engage in their preferred learning methods.

Collaborative and interactive learning is actively encouraged within the Science library, promoting a culture of group work and knowledge sharing among students.
The library also supports discovery learning by providing fingertip access to a variety of information sources, enabling students to explore and discover knowledge independently.

A notable aspect of the Science library is the emergence of teacher-learners among the students and we experienced this at the Science Library. This suggests that students are not only consumers of knowledge but also actively involved in sharing their expertise with peers, creating a collaborative and dynamic learning community.

The library effectively implements Bring Your Own Device (BYOD) policies, allowing students to use their personal devices to access digital resources and engage in online learning activities. According to students, this concept has encouraged their learning process as they can use the same device all the time when learning.

Positive collaboration between the faculty librarian and students is evident, indicating a supportive and engaging relationship. Students are actively engaged in the “Information Skill Development” programme offered by the library. Librarians play a crucial role in guiding and assisting students in their research and learning endeavours.

Blended learning procedures are actively practised within the library, combining face-to-face instruction with online resources and activities. This allows students to benefit from a variety of learning methods and adapt to different learning styles.

The library spaces are not limited to academic activities alone. Student societies utilize the library for organizing collaborative activities, promoting interdisciplinary engagement, and fostering a sense of community among students.

The library facilitates continuous transitions between formal and informal learning methods, providing students with flexibility in their learning approaches. Students can easily switch between structured classroom learning and self-directed, informal learning within the library environment.

Overall, the Science Faculty Library stands out, as the most popular and fully engaged learning space within the university. Its implementation of knowledge-based procedures, collaboration with students, and provision of diverse learning spaces contribute to a vibrant and enriching learning experience for the entire university community.

By addressing these factors and providing a well-equipped, comfortable, and engaging learning environment, the Science Faculty Library of the University of Colombo aims to meet the expectations of Generation Z students.

All the learning spaces created at the Science Faculty Library or the Information and Learning Centre of the University of Colombo ensure students' active engagement in learning activities outside the traditional classroom environment. Once this engagement in learning becomes a habit among the students, it can be easily applied in formal learning setups, such as classrooms.

Therefore, the most important aspect of today's higher education is to develop knowledge-based practices among students. As an academic librarian in higher education, I am happy about my contribution to developing knowledge-based practices in students.

Before concluding my speech, let's explore how academics in the higher education sector can implement this concept within their own university or institution.

Strategies that can be employed to promote and implement knowledge-based practices within your university or institution

We can do this by expanding the university’s learning environment. Non-classroom spaces should be redesigned to support and extend students' learning, providing flexibility in time and space.

We can create dedicated learning spaces within the university or institution where students can engage in collaborative learning and access resources relevant to their fields of study.

These spaces can be equipped with modern technology, research materials, and comfortable seating arrangements.

As teachers in HE we should prioritize creating a student-centred learning environment where learners feel valued and empowered. This approach promotes deep engagement in learning and fosters greater student responsibility for their own learning outcomes.

We can encourage active and experiential learning among students. By providing learning opportunities that align with students' preferred styles, such as discovery, exploration, experimentation, and problem-solving.

Integration of real and virtual spaces should facilitate continuous transitions between real and virtual spaces within the educational environment which match with education 4.0. Encouraging collaboration among learners in both physical and online settings can foster a collaborative and dialogue-based learning mode.

By implementing these strategies, we can create an environment that nurtures knowledge-based practices and enhances student learning outcomes.

Therefore, as teachers in HE we have to think beyond the formal classroom setup and need to create an environment to enhance their knowledge and skills outside the classroom through informal or non-formal learning practices as expected by today's learners.

If we could help our students to develop 'knowledge-based procedures' outside the classroom, I'm sure they will bring this into your formal classroom and actively engage in the formal classroom setup as the next step.

Thank you.

Wish you all the best and have a great day!!!

References

Barnes & Noble College | Getting to Know Gen Z – Exploring Middle and High Schoolers' Expectations for Higher Education

Hegade, P., & Shettar, A.S. (2022). Elevate-Z: A Model to Create Learning Spaces for Generation Z Students. *Journal of Engineering Education Transformations*, 35, 175-180.

Cilliers, E., J. (2017). The Challenge of Teaching Generation Z. PEOPLE: *International Journal of Social Sciences,* 3(1), 188-198.

Molina, A., Villegas, B., Ochoa, C. P., and Miranda, J. (2022). "Academic continuity during the Covid-19 global health emergency: education 4.0 and the flexible-digital model of Tecnologico de Monterrey University in Mexico supporting secondary education" in University and school collaborations during a pandemic knowledge study in higher education". eds. F. M. Reimers and F. J. Marmolejo (Cham: Springer), 149–163.

Radcliffe, D., Wilson, H, Powell, D. & Tibbetts, B. (2008) *Designing next generation places of learning: collaboration at the pedagogy-space-technology nexus.* ALTC Priority Project #627," Australian Learning & Teaching Council, 18 pp.

Seemiller, C. & Grace, M. (2016). *Generation Z Goes to College.* Jossey-Bass. 320 p.

Somaratna, S. D. (2019). Millennials' Service Quality Expectations: A Challenge for Academic Librarians. Journal of the University Librarians Association of Sri Lanka, 22(2), 74-85.

Somaratna, S. D. (2022). Planning and Designing Learning Spaces in Academic Libraries: A Case Study at Information & Learning Centre (ILC) of the Faculty of Science, University of Colombo. *Journal of the University Librarians Association of Sri Lanka,* 25(2), 1-33.DOI: https://doi.org/10.4038/jula.v25i2.8055

Spady, William G. (1994). *Outcome-Based Education: Critical Issues and Answers.* American Association of School Administrators, Arlington, VA.212p.

World Economic Forum (2016). *The Fourth Industrial Revolution: what it means, how to respond.* https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/