Revolutionising Library Services: Transforming Lien Ying Chow Library to An Unmanned Patron-Centric Library

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Abstract
To stay abreast of the ever-changing landscape of libraries and technologies, Lien Ying Chow Library (LYCL) of Ngee Ann Polytechnic (NP) underwent an innovative transformation into an unmanned patron-centric library. This was implemented in an agile manner through patron-centric design thinking via a four-phase approach of strategising, planning, building, and implementing a strategic integration of three key thrusts of systems automation, process re-engineering, and change management.

This paper discusses the motivation for the transformation and the adopted approach of strategic integration of the three key thrusts of technology, process, and people. The paper also shares the impact and benefits that the transformation brings to the library operations effectiveness and efficiency as well as enhanced patron experience, staff well-being, and development.

Keywords*: Transformation; unmanned library*; *patron-centric; UHF RFID*; *robotic library assistant*; *digitalisation*; *automation*; *process re-engineering; change management; paradigm shift*; *future-preparedness; live chat; operations effectiveness; efficiency*

Background and Motivation

Ngee Ann Polytechnic (NP)'s Lien Ying Chow Library (LYCL), like most other libraries, used to rely on rostered library staff throughout the day to man service counters to aid patrons, answer queries, and patrol the library. There was no luxury of full-time counter staff and all library staff in the LYCL were rostered for counter services, above and beyond their primary core library roles and workload. Patrons were also highly reliant on the library counter staff for services and help.

The situation was further challenged with the reduction of manpower and long daily operating hours of LYCL. Each library staff had to shoulder additional counter duties per week, adding on to their already full work load. With NP library management motto of leadership by example, management staff were also rostered alongside all the library staff to share and alleviate the counter duty crunch.

A pilot to leverage on student helpers was explored but it was not ideal during the academic term when students had their scheduled classes and service-levels were inconsistent. With student helpers, it also increased the operating cost of the library and operational overheads of having to brief new students due to turnover.

Faced with an unsustainable situation, LYCL brainstormed various solutions and embarked on a transformation journey to become an unmanned patron-centric library. The solution includes:

- Streamlining library processes and services for increased productivity and simplicity;
- Leveraging self-service technologies for library services;
- Virtual interactions between patrons and library staff through online platforms;
- Enhancing the availability and accessibility of online services and resources; and
- Upskilling the library staff's skillsets.

The Transformation Approach

LYCL's transformation into an unmanned patron-centric library is a bold pioneering step in library innovation. It focusses on patron-centric design (Priestner & Borg, 2016) that prioritises both the patrons' needs and the library staff's well-being.

The transformation embodies the integration of three strategic components:

(1) **Technology & Digitalisation**: Digitalisation and self-service technologies to provide seamless access to LYCL, library resources and transactions beyond LYCL premises and operating hours, 24/7.
(2) **Policies & Processes Re-engineering**: Policies and tasks were streamlined to reduce reliance on human intervention while ensuring seamless service.
(3) **Change Management – Paradigm Shift of Patrons and Library Staff**: A paradigm shift in operations that would require patrons and staff to adapt to new norms.

The implementation has adopted the agile methodology (Gürkan, 2023) that uses a four-phase approach of strategising, planning, building, and implementing efficiently and effectively. This thus enables quick ideas to be piloted, tested, improved, and implemented iteratively to ensure it best meets the patrons' needs.

This transformation brought about improved operations efficiency and effectiveness, improved accessibility, and enhanced patron experiences while addressing the manpower challenges and preparing for future-readiness. Patrons are now served by intuitive self-service systems, robotic library assistants, and online services available 24/7 that are seamless and patron-centric. Patrons can continue to receive help from library staff remotely via live chat (Frueha & Hellyar, 2021). The service excellence standard has been effectively enhanced by this solution.

Patron-centric Design Thinking

The needs of the patrons continue to be of utmost importance, hence an important consideration in the transformation journey.

Understanding Patrons' Interaction with Library Staff at Counters

To better understand the patrons' needs at service counters, LYCL developed a simple counter-logging application on the onset. For a period of six months, all service counter staff on duty diligently logged all the patrons' requests, queries, concerns, or provided help at the counters on the application.

A detailed analysis of the patrons' needs from the log provided good insights into the various patrons' interaction with the library staff at the counters. These needs were categorised and addressed as follows:

- **Need for directional signages**
  The polytechnic campus and within the LYCL premises urgently needed improvements.
    - relevant polytechnic custodians were roped in to make improvements, e.g. a suggestion was for the polytechnic estates management to improve directional signages to schools and lecture theatres;
    - Physical directions and signage within the LYCL premises were enhanced for better clarity. Additionally, a Wayfinder application was developed and integrated into the library discovery system. This application provides essential information to help patrons navigate to the correct shelves in the library to find their desired titles.
- **Need for prominence of information and clarity**
  Improvements in terms of clarity and prominence of information, resources, and services were made on the Library Portal, the newly launched Library Mobile app, and on the library premises.
- **Need for simplicity and user-friendliness**
  Policies and processes were streamlined, removed, or simplified thus becoming more intuitive, friendly, and simple for both the patrons and library staff.
- **Need for self-service and automation**
  Implemented the UHF RFID infrastructure with various self-service technologies and kiosks.

Focus Group Discussions and Polling of Patrons to Verify Concepts

As part of the transformation journey, annual focus group discussions and surveys were conducted with students and staff to gather feedback on the use of library facilities, resources, and services. This ensured that patrons' voices and wish lists were heard and incorporated into the transformation process. For example, patrons shared the queries that they had when visiting the library counter. By analysing these queries, the library could gain insights, identify patterns and challenges, and explore the feasibility of self-service initiatives such as the Robotic Library Assistant, Digital Service Points, and Library Go!

The library team overseeing the project would then develop a service concept, detailing the service design and articulating the value and outcomes to the Library Management for feedback. LYCL also validated various concepts in the transformation with patrons and library staff by leveraging short polls to gather additional insights. Through an agile approach, these concepts were refined iteratively based on feedback until their actual implementation. This process enhanced the relevance of the services to the patrons.

Library Initiatives to Harnessing Digitalisation & Technologies towards an Unmanned Library

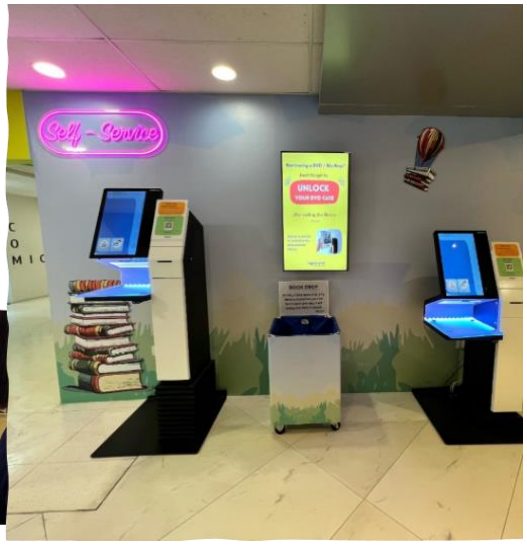
LYCL has embraced digitalisation to enhance its services and operations as well as streamline processes for the library staff. The adoption of alternative technology solutions hinges on critical needs and cost-effectiveness.

Key technological initiatives in the transformation to an unmanned patron-centric library include:

1. Self-service Technologies to Facilitate Loans of Resources

'Borrow & Go' – Self-Service Technology

The deployment of UHF RFID and barcode scanning allow patrons to borrow and return multiple items seamlessly in one go at the Self-Check-Out Systems instead of traditionally returning one item at a time. The 'Borrow & Go' concept creates a hassle-free, seamless, faster, and more pleasant experience for patrons. The Self-Check-Out Systems are also fully integrated with the Library Management System to update patrons' loans and returns automatically without the need for staff intervention.



Library GO! – Online Catalogue, Reservation, & Collection System 24/7

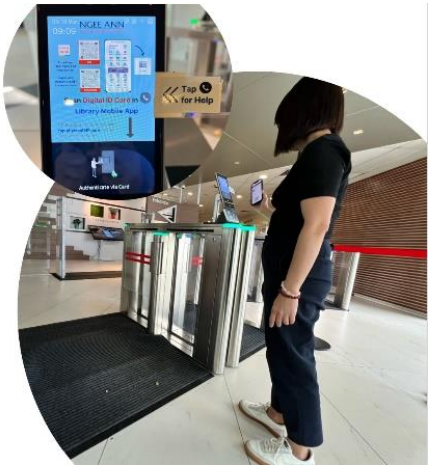
This online system allows patrons to search, browse, reserve, and collect materials from the Library GO! smart lockers anytime at their convenience, facilitating 24/7 access to library services, beyond the operating hours of the physical library. It also caters for the return of library resources.

2. TEMI – the Robotic Library Assistant

In 2020, LYCL became the first academic library to acquire the service robot TEMI and develop it into a Robotic Library Assistant by integrating a standard robotic solution with the library know-how. The knowledge was shared with some academic libraries that subsequently deployed TEMI in their libraries.

The TEMI robotic library concierge patrols LYCL daily, helping patrons navigate the library to locate books and connecting patrons remotely with library staff for further assistance. TEMI also helps with surveillance of the LYCL remotely controlled by the library staff. The LYCL unmanned library is currently served by two TEMIs. More features will be added to TEMI as new needs arise.

3. Automated Gantries



With the deployment of the automated gantries with authentication, only authorised members can access LYCL which enhances LYCL security. The access data from the gantries enables LYCL to know our patrons better hence improving personalisation initiatives. They also provide better patron management for future preparedness in lieu of potential pandemic or crisis.

The gantries are also equipped with a facial recognition feature to facilitate library operations. This feature is only enabled for LYCL staff as of now. LYCL decided against deploying this feature for patrons to minimise personal and sensitive data from being shared and to not further add on to maintenance cost. It was evaluated that authentication through the newly launched Library Mobile app is more cost-effective and is sufficient to achieve the purpose of authentication.

Surveillance cameras will be activated to take snapshots when the gantries are triggered by patrons leaving LYCL with unchecked library resources.

4. Digital Service Points

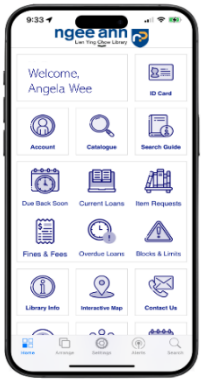
LYCL provides digital service points to assist patrons with easy, independent navigation around the library, address directional and loan queries, and guide them in seeking virtual assistance for reference-related questions via MS Teams.

The deployment of **Wayfinder** technology allows patrons to easily find their way around the library to locate the resources within LYCL. This feature is available on premises, the Library Mobile app, and the Library Portal.

Live Chat via Microsoft Teams allows library staff to assist patrons remotely, improving accessibility and responsiveness without being physically present in LYCL. Previously, other live chat avenues like Social Intents and HappyFox were used.

5. 24/7 Remote Access to Digital Collections

Patrons have round-the-clock access to E-databases, E-books, and multimedia resources, supporting NP's Online Asynchronous Learning (OAL) and extending the library's reach and services to the patrons, wherever they may be and beyond the operating hours of LYCL.



6. Library Mobile App

LYCL implemented a library mobile app with a full-fledge online library functions and services for the patrons. Patrons can use the app to authenticate themselves for entry to LYCL and perform a suite of self-service transactions such as search reserve, check loans status, and pay library charges 24/7.

Change Management Approaches to Manage the Mindset of Patrons and Library Staff

The shift to an autonomous operation was not without pain-points or inertia. The library met with initial resistance and a period of adjustment was required. Implementing comprehensive change management strategies (Grønvad et al., 2024) and fostering a mindset change were essential to align the perspectives of both patrons and library staff with the new operational model.

Patron Mindset

When the automated entry gantries were implemented on 17 April 2023, there was a negative sentiment among patrons that the library was now both less accessible and friendly. Through deliberate and thoughtful communication, the community realised the well-intended security benefits for their own safety and the foresight in preparing for future pandemics or crisis management.

In the change management effort to encourage self-service among patrons, LYCL strategically decreased the number of staff at the service counters from three to two and then to one staff in phases, eventually transitioning to a fully unmanned environment. As part of change management, the former counter spaces were completely sealed off and were transformed into areas for promoting new literature and fostering community engagement.

Self-service systems have been upgraded for ease of use, complemented by clear instructional signage. Additional support was rendered to patrons who are less digital savvy to adapt to the self-services systems and Library Mobile app.

Patrons who encountered difficulty or needed to connect with library staff can do so remotely via the Robotic Library Assistant (TEMI), Library Mobile app and Library Portal.

Library Staff Mindset

Throughout the transformation involving policy and process re-engineering, the training approaches used include mentoring, coaching, and knowledge sharing. For instance, Library Management conducted regular conversations with the library staff throughout the journey – from the landscape and technology disruptions, need to embrace changes, aspirations and goals, advantages, and plans to the progress of the transformation journey to support staff through change management. The library staff recognised the broader implications, understanding that the routine tasks that some of them were working on would be phased out or automated and that they needed to upskill themselves. Staff affected by these changes were reassured that with a positive outlook and a willingness to learn, they would be supported by the library management in transitioning to more strategic roles. Additionally, library management continues to work with the NP Human Resource department to explore new opportunities for any staff who is at risk of job displacement due to the changing landscape and were facing difficulty with upskilling.

Impact & Benefits

The LYCL's architecture of the unmanned library services has established a more resilient and adaptable framework which is sustainable for future-preparedness, positioning LYCL as a forward-looking institution ready to meet the community's evolving needs.

Internally, this has not only led to higher cost savings as well as operational efficiencies and effectiveness, plus improved the library staff's well-being and development. In terms of the patrons, this initiative improved patron experiences, accessibility, safety, and convenience.

More Effective & Efficient LYCL Operations & Processes

The process re-engineering in the transformation to review the various operations workflow has resulted in identifying and removal of unnecessary tasks, streamlining and automating work processes with reduced human intervention, optimisation of resources, and expedited transactions through self-service services and systems.

The unmanned library has removed the manpower requirements on premises, translating to financial savings of having staff or paid student helpers.

The use of data analytics plays a crucial role in tweaking the operating needs of LYCL, for example, determining the most effective operating hours for LYCL to serve the patrons, ensuring that energy consumption is kept to a minimum without compromising service availability.

Enhanced Patron-Centricity and Experience

The transformation has embraced a patron-centric design thinking approach where the service level for the patrons is enhanced through improved efficiency, accessibility, convenience, and security.

Services such as Library GO!, the Library Mobile app, and the Library Portal with the live chat feature extend LYCL's reach beyond the LYCL premises and its operating hours, providing patrons with 24/7 access to library resources and remote assistance, at anytime and anywhere.

Patrons enjoy round-the-clock access to digital resources, including collections, catalogues, and reservation systems, through the Library Mobile app and Library Portal.

With better knowledge of the patrons, LYCL will be able to embark on personalisation services in the near future.

Library Staff Well-being & Upskilling Opportunities

The move towards automation has liberated staff from the demands of counter duties, mitigating the impact of manpower reductions and the cumulative stress associated with juggling the counter service duties above their current core responsibilities and workload as well as LYCL long service hours.

This has enabled staff to concentrate more effectively on their library core responsibilities and engage in higher-level tasks such as curating resources, developing programmes, and designing E-learning initiatives for the academic schools and the lecturers. With additional time to pursue professional development in emerging fields such as Robotic Process Automation (RPA), Analytics, and Generative AI, staff satisfaction has increased thus fostering a more impactful contribution to the library's objectives.

Conclusion

LYCL takes pride in being a leader in library innovation and this transformation serves as a reference model for academic libraries seeking to address challenges like manpower reduction, the need for rapid adaptation in education changes, rising patron expectations, and the necessity for library staff skill to upgrade and innovate.

The data collected from the Library's Digitalisation & Technologies initiatives have empowered LYCL to gather and analyse information, optimising services, tailoring resources to meet patrons' needs, and adjusting operating hours. These data analytics and insights can be leveraged in the future to personalise services for patrons.

The spirit of continuous improvement to stay relevant and preparedness for change requires commitment from leadership to the ground. This spirit should be encouraged across all libraries' staff.

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