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Nurturing creative talent with industry partnership in Hong Kong

Abstract

The creative industries in Hong Kong anticipated a shortage of employment candidates with relevant experience and training. Emerging technologies are transforming current technical and vocational skills. Employees of the future are expected to shoulder tasks that require creativity, analytical skills, problem-solving, and entrepreneurship. This article is a case study of an initiative in Hong Kong to innovate technical and vocational education and training for the information and communications technology (ICT) and the creative industry. The initiative involves a tripartite partnership between secondary schools, industry partners, and Hong Kong Baptist University. The article first discusses the talent needs of the creative industry and the emerging job opportunities in the Art Tech domain. Based on a skill mapping study, three future jobs, including content curator, business designer, and creative technologist were identified for the Art-Tech sector. The functions and duties of these future jobs were elaborated. It gives the background of the CLAP-TECH Learning Pathway program which is modeled after IBM's Pathways in Technology Early College High School (P-TECH) education model. The "CLAP-TECH Learning Pathway" includes two applied learning courses—Tech Basic and Multimedia Storytelling—offered in senior secondary schools with further study opportunities. Industry partners provide out-of-classroom learning in the form of mentoring, curriculum co-development, guest lectures, and company visits. The set-up of the organization within the university system, the recruitment and maintenance of the industry partners, and the program evaluation mechanism was discussed. Students' learning outcomes of the program focus on ICT education and training were used as an indicator of the initial success of the program. Further development of the program and the research gaps were identified and presented.

Keywords: *ArtTech, creative industries, future jobs, articulation pathways, creativity education, case study*

1 Overview of the talent demands of the creative industries

According to a manpower demand survey conducted by CreateHK in 2016, 40 percent of employees in creative industries anticipated a lack of applicants with relevant experience and training, constituting a major recruitment problem (CreateHK 2016). The creative media thrive on a strong creative skillset, business acumen, and a mindset open to using technology to communicate ideas. Creativity and problem-solving skills are in the greatest demand but are very hard to recruit (Google & Ipsos 2019). As leaders, creative personnel can help companies achieve key business goals through clever design (Field 2015). Interviews with

creative industry leaders reveal demand for creative talent, but report that those recruited often lack the grooming necessary to make them fully digitally equipped (IBM 2021).

Emerging technologies such as artificial intelligence (AI), augmented reality, virtual reality and machine learning can be combined with creative tools such as iMovie, Wix, or Canva to make manual tasks easier for everyone (McMahon 2019). Employees no longer need to spend long hours editing photos or a movie or managing content on a platform. In the future, they will be able to concentrate on tasks that require creative, problem-solving, analytical, and entrepreneurial skills (Van Nuys 2019; Vocational Training Board Hong Kong 2019; World Economic Forum 2020). Future jobs in marketing, content production, and product development will require employees to be creative and have good problem-solving skills (World Economic Forum 2020).

Even today, the workforce in the multimedia and creative media industries requires transferable competencies if they are to remain adaptive to the rapid changes in the workplace and to technological development. Their training and education should go beyond the use of specific software or platform tools to more generic competencies such as creating design concepts, generating project plans, and negotiating business needs with clients (Nguyen & Diep 2021).

Google and Ipsos have developed a 2x2 grid to identify skills that are important but difficult to find based on a survey of 99 respondents from Hong Kong corporations (Google & Ipsos 2019). The grid classifies skills as low in demand and easy to recruit, low in demand and hard to recruit, in high demand but easy to recruit, or high in demand and also hard to recruit. Problem-solving, creativity, and data analytics were the three skills classified as in high demand but very difficult to recruit. Another Hong Kong study has identified instructing, managing, or motivating others (58%), creativity and problem-solving (54%), and team working (52%) as the three skills in which employers most need to train their managers and administrators (Census and Statistics Department Hong Kong 2019). For professionals, the most important skills requiring training were found to be creativity and problem-solving ability (41.7%).

2   Art tech and its impacts

Art Tech refers to the application of technology in artistic creation to enhance the content and delivery of artistic creation, facilitate the succession of arts, as well as provide the audience with engagement opportunities and a deep experience (The Government of the Hong Kong Special Administrative Region 2021). Art Tech is a global trend that is changing how people perceive, consume, and interact with art and culture. It creates new possibilities for artists, audiences, and industries, broadens the horizon of creativity in the arts, and brings new opportunities for the creative industries (The Chief Executive of Hong Kong 2020). In Hong Kong, the government has set aside HK$100 million to encourage local organizations to

undertake art tech projects, enhance art education, as well as provide venues and free facilities for experimental use (The Chief Executive of Hong Kong 2020).

Even before the COVID-19 pandemic, art tech was disrupting cultural ecosystems worldwide. Britain has its #CultureisDigital project. Korea has its Korea Creative Content Agency, and Taiwan too has a cultural policy agenda. These governments have allocated resources and constructed experimental spaces for artistic expression involving technology. Adopting virtual reality in theaters or art galleries is a prominent example (So & Lam 2020). Revenue growth in the art tech sector has ranged from 5.2% in 2017–2018 in Taiwan (Ministry of Culture Taiwan 2019) to 6.5% over the 2014–2018 period in South Korea (Korea Creative Content Agency 2021). In Hong Kong annual manpower growth of 3.1% is officially projected for the art and tech industry compared with the 0.3% projected for other industries (Census and Statistics Department Hong Kong 2019). Art tech is also expected to contribute more to GDP growth in Hong Kong than other industry sectors.

Art Tech expressions are not unfamiliar to Hong Kong residents. Museums in Hong Kong have taken initiatives to curate technology-enhanced exhibits which bring immersive experiences to the public. For example, when six mummies from Britain were displayed at the Hong Kong Science Museum, visitors could peel back virtually the different layers of the Nestawedjat mummy's linen wrappings on an electronic interaction screen to the resin that was used to preserve her body. That revealed the amulets that were buried with her, and finally her skeleton (Raybaud 2017). Today, non-fungible tokens and blockchains are creating a new market for digital art (Zeng 2021).

Apart from generating new markets, Art Tech also influences hiring in the arts. According to the Google and Ipsos study mentioned earlier, 64% of Hong Kong's companies reported difficulties in hiring employees combining strong numeracy with creative skills (Google & Ipsos 2019). Nowadays, some European countries are investing in promoting a blending of artistic and tech initiatives. In June 2019, cultural institutes from Austria, France, Germany, Italy, and Switzerland in the San Francisco Bay Area formed a new partnership, EUNIC Silicon Valley, to explore together the intersection of Art + Tech (Hochman & Reben 2019). Software, computer games, and interactive media account for 50% of the creative sector's value-added and manpower. In Hong Kong, these three product categories are demonstrating constant annual growth in contrast to traditional creative sectors showing no growth (Census and Statistics Department Hong Kong 2020). Such creative sectors expect their employees to acquire coding and other computer skills and to communicate their ideas using digital tools (Field 2015). The higher education sector has a role to play in nurturing art tech talent. The Hong Kong Baptist University, for example, considers itself well-positioned to push art tech forward by leveraging its strengths in both the creative arts and the sciences (Hong Kong Baptist University 2021).

New collar jobs emerge as a result of the new technical and professional skills required for 21st century jobs (IBM 2022). New-collar jobs typically involve technical, and hands-on work. They may not call for a traditional college degree but do require considerable skills or

talent, either learned or self-taught. Examples of new-collar jobs include jobs in the information technology sector such as mobile app developers, cybersecurity specialists, cloud server technicians, and project managers. In the creative media sector, examples include graphic designers, social media specialists, media production assistants, and digital marketing assistants.

In early 2021 our group at the Hong Kong Baptist University used IBM iX, IBM's digital and design consultancy arm, to identify key job roles in the creative media industries (IBM 2021). A qualitative skill mapping study was conducted that involved ten in-depth interviews with secondary school and higher education educators, professionals in the creative media industry, leaders of related professional bodies, and potential employers. The objective was to understand the current weaknesses and difficulties in educating talented young persons in the creative media and storytelling industries. The study also attempted to identify future skill demands and job roles in those industries in Hong Kong over the ensuing five years. According to this study, three key future job roles were identified, including content curators, business designers, and creative technologists. These three future job roles have different levels of requirement in their storytelling, creativity, technology, and entrepreneurship competence (see Table 1). The function of the content curator is to analyze the communication context and create the most relevant content in different formats across different platforms, including video, sound, and animations. His or her duties will include gathering, arranging, and analyzing data about the situation, brainstorming, storyboarding the idea, and creating and presenting the content in a creative and well-organized manner. The function of the business designer is to understand business challenges and provide a design solution to enhance consumer experiences. His or her duties will include communicating and collaborating with clients to understand business challenges and opportunities, conducting market and product research, and designing business models that enhance user experiences. The function of the creative technologist is to develop prototypes and explore new technologies and help implement changes. His or her duties will include conducting research with users to identify problems, suggest creative ideas to solve problems, visualize the idea with different technology, and create prototypes to validate the design. The findings of the skill mapping study guide the development of vocational and technical education and training models for the creative industries in Hong Kong.

Table 1:   **Key Future Job Roles**

	Content Curator	Business Designer	Creative Technologist
Storytelling competence	✓ ✓	✓ ✓ ✓	✓ ✓
Creativity competence	✓ ✓ ✓	✓ ✓	✓ ✓ ✓

Technology use competence	✓✓	✓	✓✓✓
Entrepreneurship competence	✓✓	✓✓✓	✓✓
Possible job titles	Digital Marketer PR Executive Content Manager Video Producer Content Creator Brand Strategist Visual Comm Designer	Business Analyst Experience Designer Product Designer Product Owner Brand Designer Design Consultant UI/UX Designer Information Architect	2D/3D Animator Multimedia Artist Web Developer Visual Comm Designer Product Designer UX/UI Designer

3 From P-TECH to CLAP-TECH

In 2011, IBM launched its Pathways in Technology Early College High School (P-TECH) education model in Brooklyn, New York in response to the need for equity in education and the emergence of new job categories (Litow & Kelley 2021). P-TECH is an educational model to provide young people with professional skills for the 'new collar' jobs created by emerging technologies as well as university studies (IBM 2017). IBM partnered with secondary and tertiary educational institutions, industry partners, and other funders in a program designed to prepare students equipped with specialized and career-ready industry knowledge and workplace skills through lectures, practical experience, and mentoring. The P-TECH model attracted global attention for its success as a direct link to entry-level jobs in the ICT industry (Flynn, Pillay, & Watters 2015). Over the subsequent decade, the P-TECH concept grew from one school in the U.S. to 266 partner schools, 200 higher education partners, and more than 600 industry partners in 28 countries (IBM 2021).

The P-TECH concept was introduced to Hong Kong with a generous donation from the Hong Kong Jockey Club Charities Trust. The Hong Kong version is known as the CLAP-TECH Learning Pathway. It leveraged the success of the CLAP@JC program funded also by the Hong Kong Jockey Club Charities Trust. CLAP@JC is Hong Kong's first cross-sectoral initiative supporting career and life development. The objective is to build a sustainable system that smooths young people's transition from school to work. The program encourages youth to maximize their potential through multiple work-study pathways. The framework is built on engagement, self-understanding, career and pathway exploration, as well as planning and career management. Students are encouraged to identify their career interests and to create different pathways to success and self-actualization (CLAP@JC 2022).

The CLAP-TECH Learning Pathway is a school-university-business partnership. The talent development pathway progresses from school to work using industry-recognized course content based on industries' skill mapping. The program takes a new collar approach, providing workplace learning opportunities and placing the participants first-in-line for

interviews for available jobs. So, the CLAP-TECH Learning Pathway is trying to cultivate a learning pathway within the mainstream for students who are looking for an unconventional mode of learning to prepare them for a career.

Based on this concept, the CLAP-TECH Learning Pathway was designed specifically to prepare young persons for a career in interactive computer technology and/or the creative media. The pathway is a five-year journey starting in the final three years of secondary education leading into a two-year post-secondary program. The secondary school component differentiates the CLAP-TECH Learning Pathway from most of the other technical and vocational training available in Hong Kong. Applied learning courses like Tech Basics and Multimedia Storytelling can lead to both academic and professional recognition for the program's graduates. Applied Learning courses are elective courses within the formal senior secondary curriculum and are linked to specific professional and vocational sectors. These courses are usually offered by post-secondary institutes in Hong Kong (Hong Kong Education Bureau 2020). These courses enable students to develop a skill set for entry-level jobs, career-related competencies, and also generic skills. Students can explore their career aspirations and orientation for lifelong learning through these courses (Hong Kong Education Bureau 2022).

Hong Kong's government has been supporting applied learning as a way to promote whole-person education and to cater to student diversity (The Chief Executive of Hong Kong 2020). A government task force on the promotion of vocational and professional education and training has recommended that the government encourage more institutions to launch vocational training pathways following the CLAP-TECH model, starting with applied learning courses and leading to a Higher Diploma (Hong Kong Education Bureau 2020).

A CLAP-TECH Centre was established at the Hong Kong Baptist University in July 2021 to spearhead the design and the implementation of the CLAP-TECH Learning Pathway. The CLAP-TECH Learning Pathway has two tracks. The first track is the ICT track and the second track is the Creative Technology and Innovation track. These two tracks received altogether a donation of HK$136 million from the Jockey Club Charities Trust (Hong Kong Baptist University 2022). As of April 2022, the CLAP-TECH Centre has a team of 11 full-time employees responsible for curriculum development, project management, coordination with industry partners as well as secondary school educators, program evaluation, and publicity. The organizational chart of the CLAP-TECH Centre is shown in Figure 1. The program also hires part-time teaching staff responsible for the teaching and learning of the applied learning courses. The teaching staff of the CLAP-TECH Centre reports concurrently to the deans of the academic units involved.
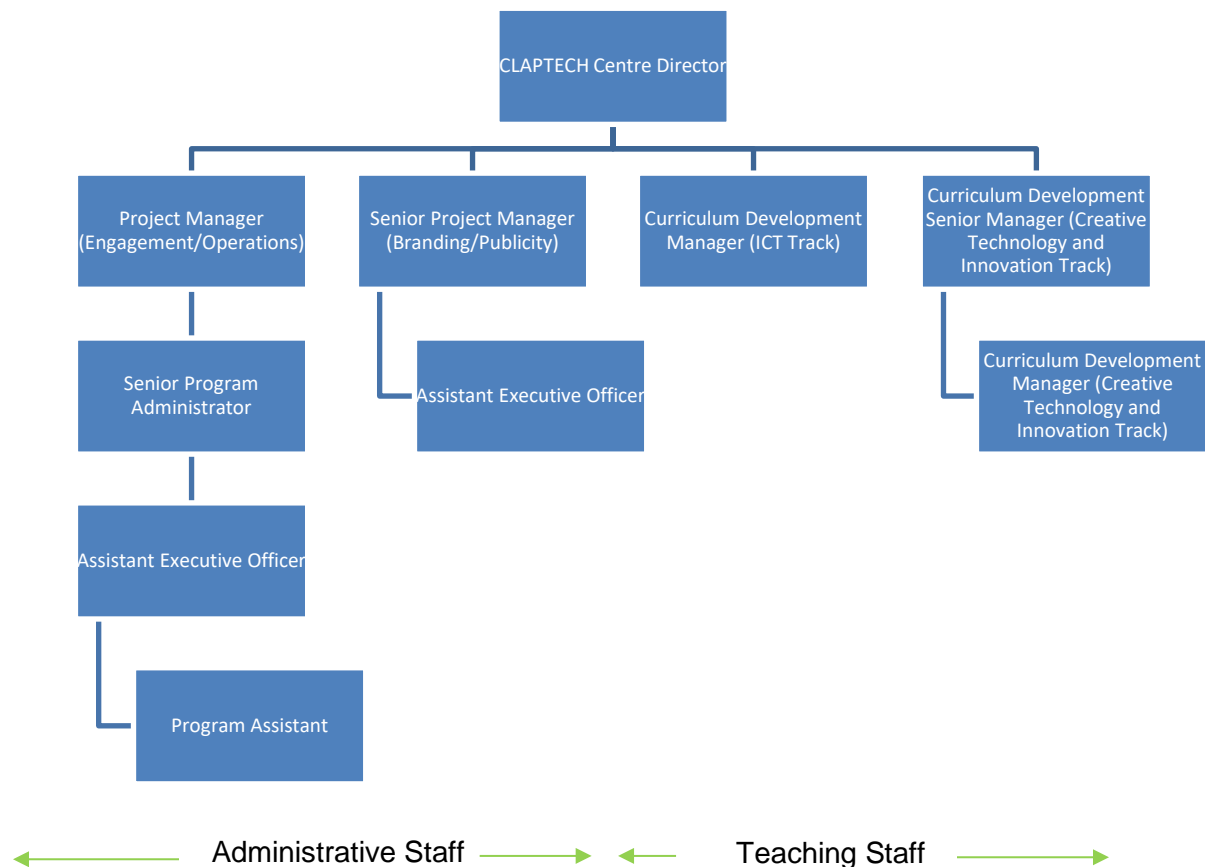
Figure 1:   Organization chart of the CLAP-TECH Centre

4   The CLAP-TECH Learning Pathway

Figure 2 provides an overview of the CLAP-TECH program. For those entering from secondary school, there will be "taster" programs that will help students to test whether they have a general interest in the new careers the program emphasizes. Students can then enroll in an applied learning course, co-taught by Hong Kong Baptist University and secondary school educators. Most students are expected to take part in this formal curriculum for two years, learning and exploring according to their interests. Those two years will begin to prepare the students for career and life planning. They will learn about themselves, the industry, and career options. The CLAP-TECH program will provide young people with eye-opening learning opportunities integrated with their core subject learning extracurricular activities, and mentorship by industry practitioners. When a student has received their diploma in secondary education they will be eligible for a two-year Higher Diploma program offered by the Hong Kong Baptist University. In that program, they will take relevant core and elective courses, and receive career planning and management advice. With a Higher Diploma, they will be well-prepared to develop their entrepreneurship ideas, enter the workforce, or pursue further studies (see Figure 2).
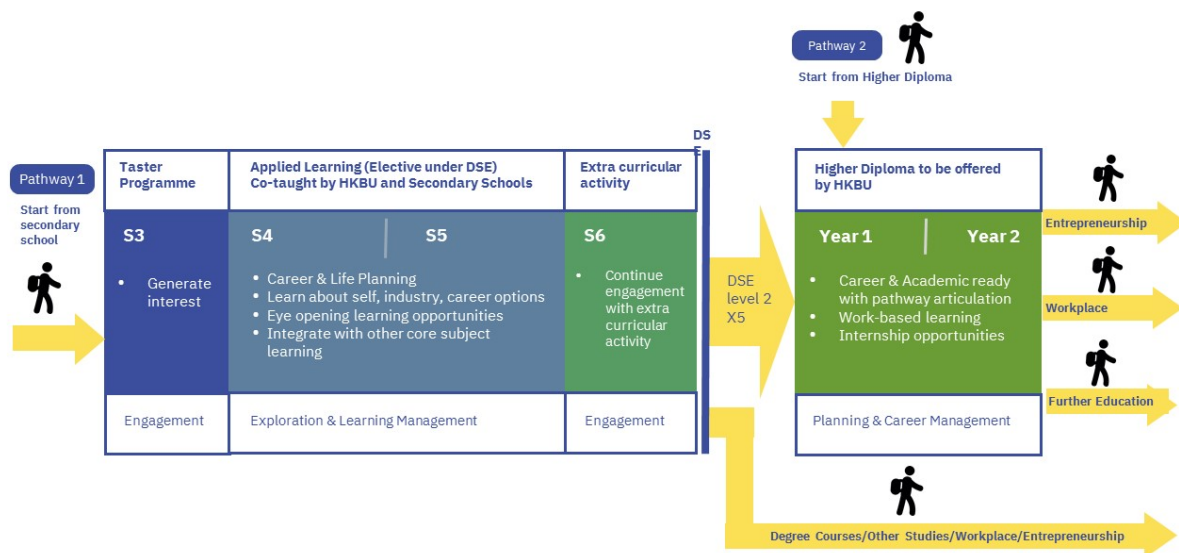
Figure 2: The CLAP-TECH Learning Pathway with its multiple exits

The first ICT track of the CLAP-TECH initiative was launched in 2019 with about 100 students from five secondary schools. They shall graduate from secondary education in June 2022. A new Higher Diploma in Data Science at the Hong Kong Baptist University will have its first intake in September 2022. That initial program focused exclusively on interactive computer technology (ICT). The second Creative Technology and Innovation track was launched in January 2022. The first cohort of students will complete their secondary education in 2024 and they will then have an opportunity to join a new Higher Diploma in Creative Media in September 2024.

5 CLAP-TECH's Creative Technology and Innovation track

The Creative Technology and Innovation track consists of 180 hours of applied learning at the secondary school level in the Multimedia Storytelling course, followed by two years of Higher Diploma study. The student-centered teaching and learning are designed to help students understand the fundamental theories and concepts of storytelling, develop generic creative skills, and explain the career possibilities in the field of creative media and communication. The program aims to provide students with a taste of the working environment in various creative media and perhaps to instill a passion for a further career in creative media or related fields. The curriculum has six modules (see Figure 3).
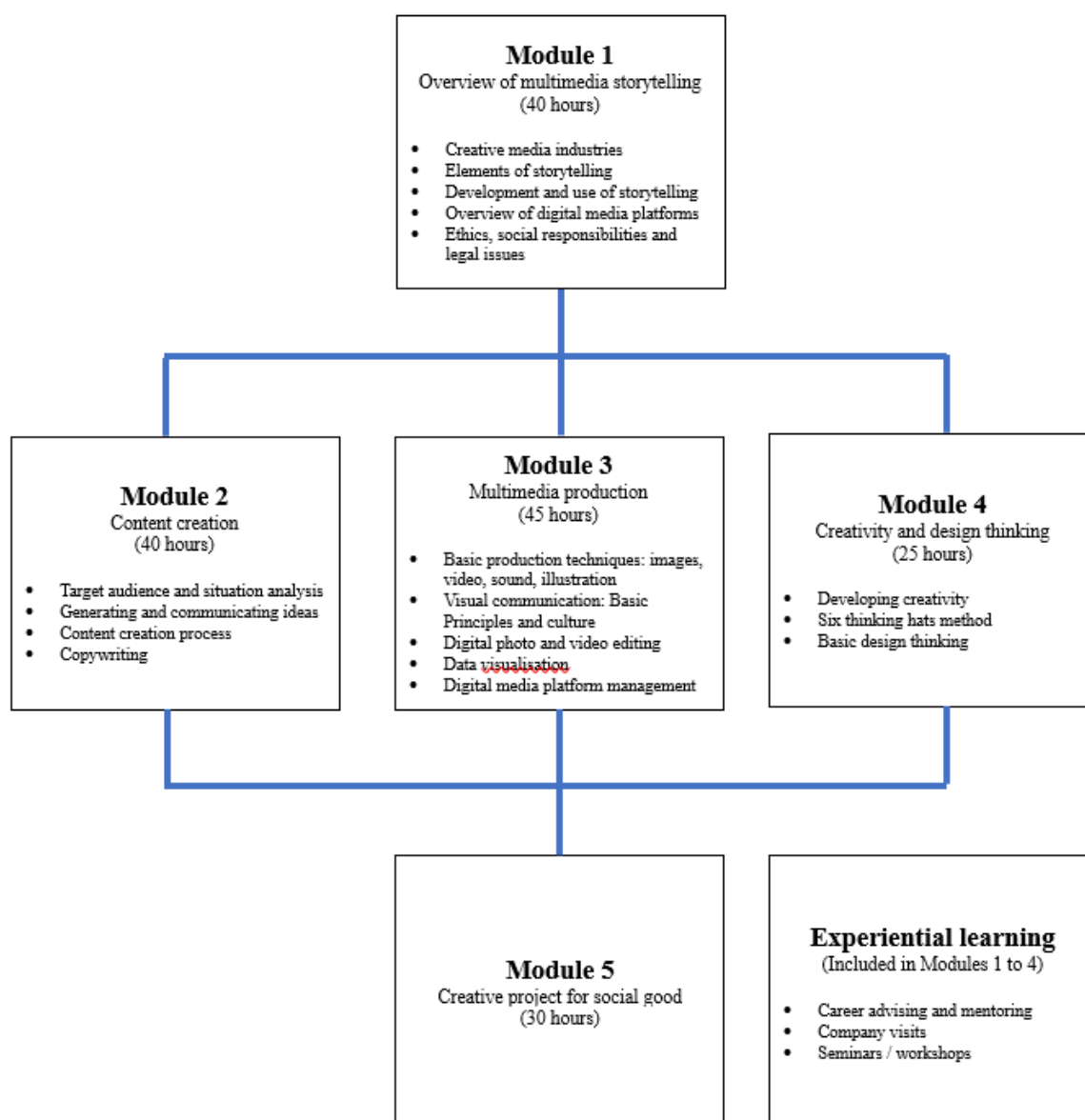
Module 1
Overview of multimedia storytelling
(40 hours)

- Creative media industries
- Elements of storytelling
- Development and use of storytelling
- Overview of digital media platforms
- Ethics, social responsibilities and legal issues

Module 2
Content creation
(40 hours)

- Target audience and situation analysis
- Generating and communicating ideas
- Content creation process
- Copywriting

Module 3
Multimedia production
(45 hours)

- Basic production techniques: images, video, sound, illustration
- Visual communication: Basic Principles and culture
- Digital photo and video editing
- Data visualisation
- Digital media platform management

Module 4
Creativity and design thinking
(25 hours)

- Developing creativity
- Six thinking hats method
- Basic design thinking

Module 5
Creative project for social good
(30 hours)

Experiential learning
(Included in Modules 1 to 4)

- Career advising and mentoring
- Company visits
- Seminars / workshops

Figure 3: The Multimedia Storytelling applied learning curriculum

The course content provides students with a systematic understanding of the context of creative media work. They will come to appreciate the relevance and importance of storytelling skills and the use of technological tools. Company visits and mentorships, co-taught by industry practitioners, as well as co-curriculum development with industry partners will provide up-to-date curricular design and eye-opening opportunities to experience the complexity of the workplace. Learning through practice in an authentic or near-authentic environment will help the young students to acquire an understanding of the requirements for fundamental knowledge and practical skills essential in the creative industries. They will consolidate their learning and demonstrate competence in creating a coherent story using

multiple platforms through a final collaborative project which will involve using multimedia storytelling to advance a social cause.

Those completing the course should be able to

- Identify the structure of a story and forms of storytelling in creative media;
- Evaluate and apply multimedia storytelling in branding, in creating news and entertainment content, in copywriting, and in public relations;
- Build a portfolio demonstrating their creative media skills;
- Explain the ethical, legal, and socially responsible way of telling a story;
- Apply creative and design thinking in creating multimedia stories serving a variety of organizational goals;
- Apply visual communication skills and basic principles of aesthetics for effective multimedia communication across creative media settings; and
- Develop self-understanding for further study and/or career development in a creative field.

With industry support for various extracurricular activities, students will be expected to acquire different competencies, skills, and attitudes summarized in Table 2.

Table 2:   **Competencies, Skills, and Attitudes**

Career-related Competencies	- Create a simple multimedia production - Apply basic visual communication principles to identify suitable visual strategies - Communicate effectively with a target audience - Understand the work requirements of the creative media industries.
Foundation Skills	- Communicate effectively through verbal and written presentations - Apply concepts in data visualization - Demonstrate competence in multimedia production
Thinking Skills	- Apply problem-solving skills in creating content for a target audience - Demonstrate analytical skills through evaluating the information about a target audience - Apply logical thinking skills when dealing with copyright and ethical issues in content creation
People Skills	Collaborate with group members in group projects and mentorship discussions

	• Apply self-management skills through setting up schedules and monitoring progress
Values and Attitudes	• Demonstrate empathy and respect for others through identifying the cognitive and affective needs of an audience • Demonstrate self-motivation through completing assignments on time • Demonstrate respect for intellectual property rights and professional ethics

6   Industry participation

Industry-school partnership in vocational and technology education has been shown to yield useful results. A study in Australia examined the impact of the industry-school partnership on systemic and human resource capacity to support the employability of school graduates (Flynn, Pillay, & Watters 2015). Results indicated that both schools and industry partners demonstrate boundary-crossing mechanics of identification, coordination, reflection, and transformation, to bring mutually beneficial outcomes. The partnership enabled teachers and school managers to work with the industry effectively and confidently (Flynn, Pillay, & Watters 2015). Boundary crossing refers to the efforts of both school and industry partners to negotiate obstacles and align objectives as well as provide a frame of reference to create a hybrid learning space for students where formal curriculum and workplace experience are closely connected (Akkerman & Bakker 2011; Zitter & Hoeve 2012). A study in the Philippines found that including industry-supported job training in the senior secondary school curriculum provided useful industry exposure. Most of the graduates of the hotel and catering and electromechanical industry pilot schemes studied were assessed by potential employers as workplace-ready (Jaca & Javines 2022).

The CLAP-TECH model has industry, a university, and secondary schools in a tripartite partnership. The secondary schools promote the program and initially enroll its students, as well as provide career and life planning support. The university co-develops the curriculum with industry partners and provides teaching for the applied learning course as well as post-secondary education. The industry partners provide advice on skill mapping and develop industry-recognized qualifications. As of April 2022, six organizations have signed agreements to be the industry partners of the ICT track and 11 have agreed to support the Creative Technology and Innovation track.

Multiple strategies were adopted to recruit industry partners for the Creative Technology and Innovation track, including referrals, personal and professional networks, and cold calling of strategic potential partners. The target industry sectors include media and technology companies, advertising and public relations agencies, museums and theme parks, youth associations, relevant professional bodies, as well as cultural centers. When initial contacts were made, face-to-face meetings were arranged to present the CLAP-TECH Learning

Pathway model. Most of the industry partners were concerned about the resource commitment of the partnership, including the number of mentors contributed, the frequency of meet-ups with students, and the number of internship placements. A few of them preferred to maintain an informal linkage to the program and did not want to sign a formal memorandum of understanding (MOU). The most enthusiastic partners were long-time friends with Hong Kong Baptist University that have supported undergraduate and postgraduate education programs in the past decades.

As the School of Communication was the pioneer in communication education in Hong Kong, the School was highly regarded and connected in the creative media industry. Industry partners often see the collaboration as an opportunity to contribute to the nurturing of creative talent, access to the student body to know more about the youth, and fulfill the corporate and social responsibilities of their business. The strategies for maintaining industry engagement include regular communication through emails, inviting them to participate in train-the-trainer activities, and industry events such as symposiums and virtual agency/firm tours.

The recruitment and maintaining engagement of industry partners took up substantial time and effort, especially during the COVID-19 pandemic. Some companies need levels of approval before establishing a formal partnership. Conventional activities such as networking lunches and face-to-face industry events were restricted due to social distancing policies. Given the increase in student intake and staff turnover in the companies, it will be a challenge to maintain an active pool of industry partners.

7   Student learning outcomes and evaluation of the ICT track

The review of the CLAP-TECH Learning Pathway program's outcomes and impact involved quantitative and qualitative surveys carried out among the secondary school students and their teachers, industry mentors, and principals. Since the Creative Technology and Innovation track was launched only in January 2022, we use the ICT track as an example. For comparison purposes, one survey was administered to classmates of the CLAP-TECH students not involved in the Tech Basic applied learning course. In addition, after each event with an industry partner, post-event evaluation surveys were conducted. All of the participating students, teachers, and mentors were invited to respond to the surveys, but their participation was voluntary.

These surveys compared CLAP-TECH students who had participated in the Tech Basic applied learning course and its associate activities with students who had not attended it. The data showed that the students who had attended the applied learning course were more knowledgeable about the IT industry and its workplaces than those who did not attend. And the students who participated in the CLAP-TECH Learning Pathway also attained higher scores in life and career exploration (see Figure 4).
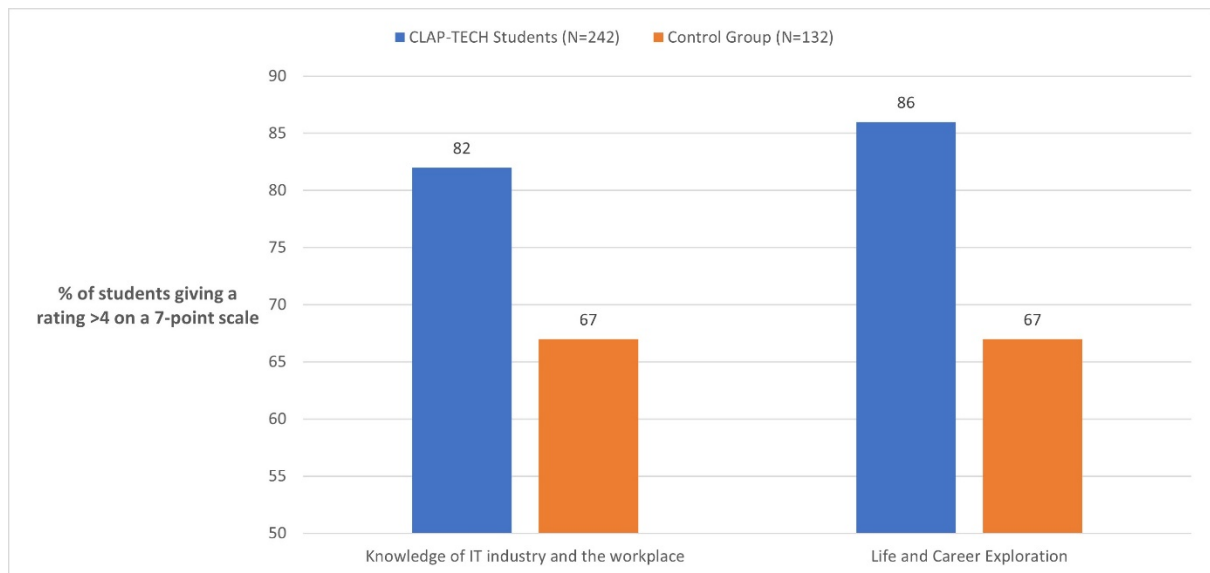
Figure 4:   IT industry knowledge and career exploration of CLAP-TECH
              and non-CLAP-TECH students

The key outcomes of CLAP-TECH are based on the BACK model which aims to
enhance the **B**ehavior, **A**ttitudes, **C**ondition, and **K**nowledge of the students, educators, and
the mentors participating. It measures behavioral change, shift in motivation, interest and
desire, circumstances and life conditions, and awareness of key information as well as the
acquisition of a skill. It aims as well at promoting overall satisfaction with the learning
experience. This BACK evaluation model was developed by the project's sponsor (The Hong
Kong Jockey Club 2017). Various outcome indicators were evaluated using quantitative and
qualitative methods. Figure 5 shows the evolution of the students' knowledge, attitude,
behavior, condition, and satisfaction ratings throughout the program. More than 80 percent of
the students awarded a favorable rating in all five categories by the end of November 2021.
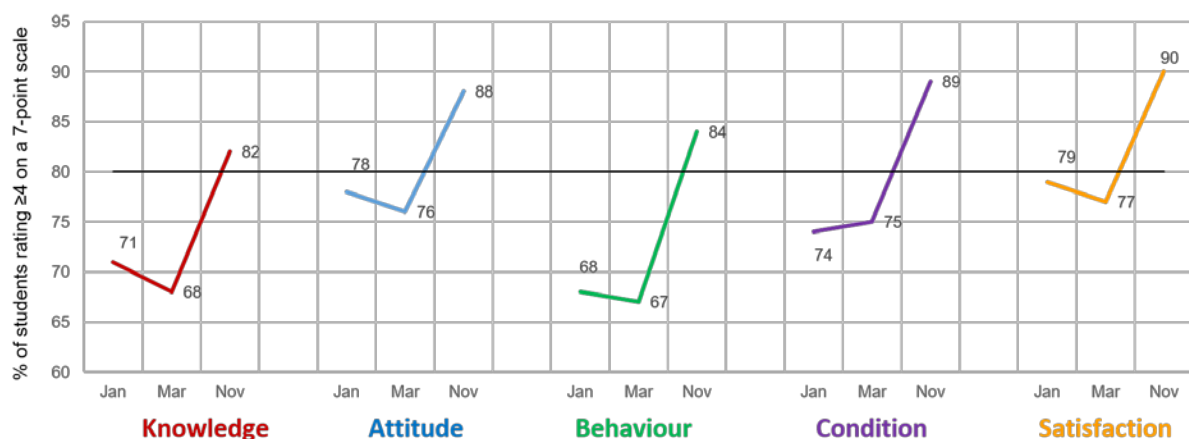

Figure 5:   Knowledge, attitude, behavior, condition, and satisfaction
              ratings of the CLAP-TECH students

8 Research gaps

In reviewing the current progress, we identify the following research gaps that need to be examined systematically:

- Identify learning theories that may help explain how students are influenced by participating in the CLAP-TECH Learning Pathway
- Develop short-term, medium-term, or long-term student learning outcomes that are likely to occur in the CLAP-TECH Learning Pathway context
- Identify the unique characteristics of the CLAP-TECH Learning Pathway that contribute to the desired student learning outcomes
- Explore ways to improve the recruitment of industry partners, how to engage them effectively, and how to sustain the collaborative relationship
- Identify roles played by various stakeholders in the CLAP-TECH Learning Pathway and the perceived factors of critical success

9 Conclusion

The 21st century job skills for the creative industries include creativity, problem-solving, analytical skills, and entrepreneurship. The design and the implementation of the CLAP-TECH Learning Pathway attempted to develop competence in the creative industries has been described. It can serve as a model of the tripartite partnership of secondary schools, higher education institutions, and industry professionals in this effort. The applied learning courses in the senior secondary school curriculum provide an opportunity for vocational and technical education and training, but relatively few students are taking these applied learning courses compared with core courses in the arts and sciences. Better promotion to senior secondary school students is needed. Student learning outcomes and their evaluations indicate that the ICT track of the CLAP-TECH Learning Pathway has demonstrated initial success. The next step should be to apply what we have learned from the ICT track to the Creative Technology and Innovation track. Systematic research should be conducted to identify specific elements of the program that are able to generate specific student learning outcomes in the short-term as well as in the long-term. A system for program evaluation is now in place. Future research is needed to develop a theoretical framework for data analysis. The research findings will inform best practices in education and training of our new generation, and prepare them for lifelong learning.

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