

Enhancing design competencies for students with special educational needs for future career development

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Some students with special educational needs (SEN) may have innate talents or interests in creative disciplines such as art and design. However, these students frequently face obstacles when pursuing a career in these fields. Difficulties and failures diminish these students' confidence and sense of self-efficacy, in turn affecting their personal development. To tackle these issues, this study explores the possibility of enhancing the strengths in art and design of students with SEN and converting these strengths into relevant design competencies that can benefit their future careers. The study begins with a review of essential topics pertaining to students with SEN, teaching and learning theory, design competency and self-efficacy theory. Hong Kong is then explored as a case study to examine the effects and constraints of current art and design education in special schools and the career prospects for graduates with SEN. The conclusion proposes a potential solution that may considerably benefit these students and involves project-based design sessions for students with SEN who excel in art and design. To help students with SEN realise their potential and make meaningful contributions to the art and design industries, considering factors such as students' learning styles, career goals, design-related competencies and sense of self-efficacy in addition to their artistic and creative aptitudes is critical.

Keywords: *career development; art and design education; design empowerment; special educational needs*

1 Introduction

Students with special educational needs (SEN) must often manage several challenges when planning and developing their careers (Fung & Lan, 2018; Horvath-Rose et al., 2004; Yang et al., 2023). Our research reveals that some students often have to take jobs involving physical labour after graduation despite having skills or competence in art and design. This dilemma can be attributed to several factors, such as a lack of guidance from relevant professionals and the high requirements of the art and design



job market. Additionally, students with SEN tend to have poor levels of self-confidence, self-image and self-efficacy because of their greater exposure to adversity and failure compared with their peers (Gurney, 2018; Heiman & Olenik-Shemesh, 2020). Studies (Betz & Hackett, 2006; Lent & Hackett, 1987) have shown a link between self-efficacy and career performance. Therefore, strategies must be developed and implemented to enhance the self-efficacy of children with SEN by transforming their strengths into 21st-century-appropriate competencies and abilities.

Several studies have discussed art and design education or digital literacy strategies for students with SEN. However, these studies have focused on teachers' educational strategies (Alter-Muri, 2017; Tohara et al., 2021), art education as action research (Escaño et al., 2021) and the impact of art and design education on students' positive attitudes (Hermon & Prentice, 2003). Few studies have focused on enhancing the design competency of students with SEN to improve career advancement. In addition, although some studies have measured the self-esteem or career-related self-efficacy of students with SEN (Gurney, 2018; Yang et al., 2020), research in the art and design fields is limited, and further research in these areas is required.

The purpose of this study is to explore the possibility of enhancing the art and design strengths of students with SEN and converting these strengths into relevant design competencies that can help students secure a career in their field. The research identifies the strategy and principles of project-based design sessions for students with SEN who have strengths in art and design.

The research questions in the study were the following:

- What is the effect of art and design education on students in special schools?
- How can students with SEN leverage their strengths in art and design to achieve improved career prospects, and what strategies can facilitate this process?
- What factors benefit students with SEN in their art and design career paths?

To answer these questions, this study first reviews the related literature and key concepts including SEN, teaching and learning theories, design competency and self-efficacy. Hong Kong is then used as a case study to review the employment of graduates with SEN and the stories of artists and designers with SEN to identify the key factors contributing to their success. Next, field research and interviews with experts were conducted in two special schools in Hong Kong to investigate how art and design education affects their students and identify their successes and challenges. Finally, to further enhance the art and design strengths of students with SEN, the paper proposes a solution for translating these strengths into relevant competencies through a project-based design session.

2 Related key concepts

The purpose of this section is to review the educational and psychological theories related to special education, along with the competencies and mindsets that students with SEN need to develop to enhance their career development. In this section, we explore these concepts in detail and discuss their implications for this study.

2.1 Students with special educational needs

The definition of and terminology for SEN vary across countries. The Department of Education and the Department of Health and Social Care (2015) in the UK define individuals with SEN as those with

disabilities or learning difficulties. The International Standard Classification of Education uses another term – special needs education – to indicate additional educational support or methods provided for individuals with various disadvantages (UNESCO, 2011).

2.1.1 Students with special educational needs in Hong Kong

This study mainly investigates cases of SEN in Hong Kong; therefore, the definition of SEN provided by the Hong Kong Education Bureau (EDB) is employed. The EDB (2021) classifies SEN into the following nine categories: (1) specific learning difficulties; (2) attention-deficit/ hyperactivity disorder; (3) autism spectrum disorder; (4) mental illness; (5) intellectual disability; (6) physical disability; (7) visual impairment; (8) hearing impairment; and (9) speech and language impairment. The Hong Kong government offers a dual-track special education mode. Students with SEN are referred to either special or ordinary schools based on their assessment results and parental consent (EDB, 2021).

A report from the Hong Kong Society for Community Organization (2019) showed that the total number of school-age children with SEN was 58,860 for the 2018/19 school year. Among students in public primary and secondary schools, 7.9% (49,080 students) were identified as having SEN. According to statistics from the Hong Kong Education Bureau (2022), 8,471 students enrolled in special education in 2021, including 8,379 students in special schools and 92 students in special classes in ordinary schools. In total, 62 local special schools, one English Schools Foundation special school and eight ordinary schools with special classes were in operation. In the 2022/23 school year, 62 special schools are aided by the Education Bureau; these schools are divided into six types, including 43 schools for intellectual disabilities, eight for social development, seven for physical disabilities, two for visual impairment, one for hearing impairment and one hospital school.

2.1.2 Models of disability and neurodiversity

Two prevalent mindsets in society currently perceive disability in distinct ways: the medical model and the social model (Clarkson et al., 2013). The medical model views disability as an impaired condition in humans and therefore needs to be healed through medication and other interventions. The social model, on the other hand, views disability as a result of social environmental and technological constraints. Therefore, these aspects must be improved to empower people equally. Neurodiversity is a perspective related to the social model theory but focuses on neurological conditions, such as autism spectrum disorders (ASD), attention-deficit/ hyperactivity disorder (ADHD), and intellectual disability (Constantino, 2018; Rosqvist et al., 2020).

Previous research has promoted respect for the diversity of students and encouraged the development of their potential based on their strengths (Benton et al., 2014). For instance, researchers call for broadening the viewpoint from correcting autistic individuals' deficiencies in social processing to discovering their strengths in non-social processing (Bossavit & Parsons, 2018; Parsons, 2016). Brosnan (2019) further suggested that autism interventions could take advantage of the strengths of autism, such as the talent for using digital technology to deal with its weaknesses. These perspectives provide valuable insights into how we can support students in more inclusive ways.

2.2 Teaching and learning theory for special education

To develop a holistic understanding of special education and more appropriate instructional strategies, researchers must comprehend how a student processes information, behaves in settings and feels when attaining knowledge or learning a skill (Conti, 2009).

2.2.1 The VARK learning styles

The VARK learning styles (Fleming & Mills, 1992) model is a commonly used categorisation system of learning types. VARK is an initialism for four learning style modes (Figure 1) – visual (V), auditory (A), read/write (R) and kinaesthetic (K) – and has been widely applied in special education research to improve teaching approaches (Colorosa & Makela, 2014). This model is also known as the foundation of the learning style model, which can be associated with other models or levels of learning difficulty to analyse learning preferences.













Visual			
Auditory			
Read / Write			
Kinaesthetic			

Figure 1. The VARK learning styles.

2.2.2 Kolb's experiential learning theory

Kolb's experiential learning theory has been widely used in special education studies (Colorosa & Makela, 2014) and is the origin of various learning models used today. Experiential learning theory (Figure 2) has two parts (Kolb, 1984). The first part introduces the learning process as a four-step cycle that includes the perception of concrete experiences, observation and reflection, abstract thinking and active practice. The second part contains four separate learning styles: diverging, converging, assimilating and accommodating. Learning style is determined by student preference when the student participates in the learning cycle. Each student's learning style can be influenced by their educational needs, characteristics and experiences. In accordance with Kolb's experiential learning theory, individuals naturally prefer specific learning approaches and styles in the four learning stages.

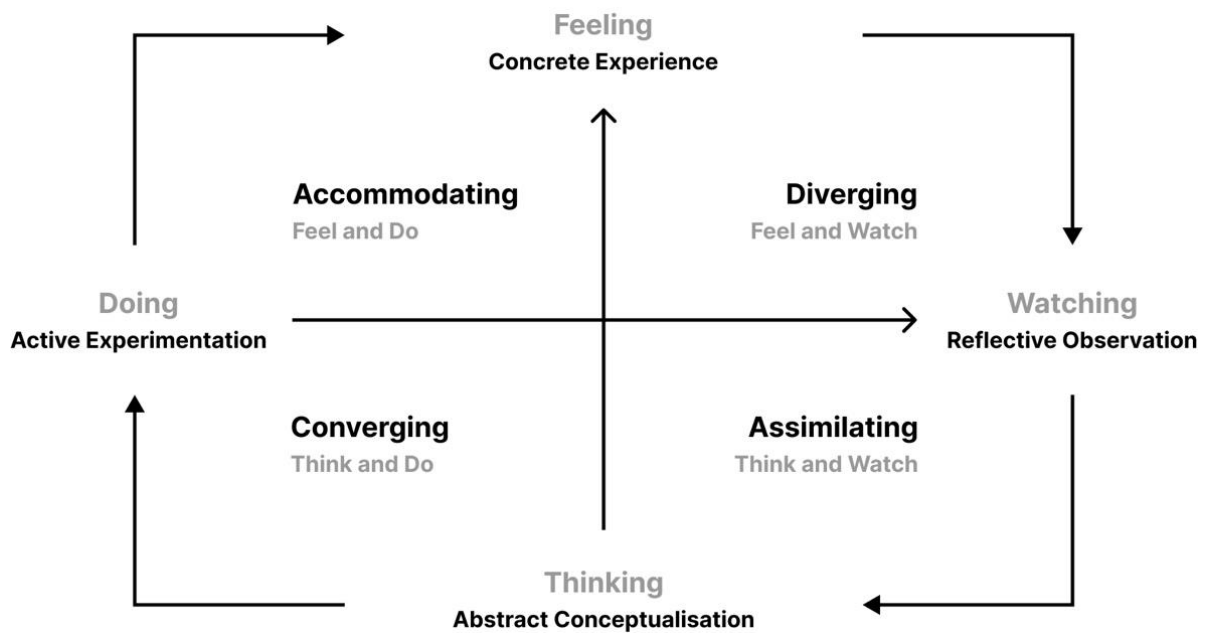


Figure 2. Kolb's experiential learning theory.

2.2.3 Vygotsky's zone of proximal development

Introduced by Lev Vygotsky, the zone of proximal development (Figure 3) is an educational and psychological concept (Bowler et al., 2005; Chaiklin, 2003; Vygotsky & Cole, 1978) that represents the area that children are unable to reach independently but can achieve with the help or guidance of others. Vygotsky believed that the learning and development of children occur in the zone of proximal development. In the field of special education, teachers and other stakeholders should not plan student development based on what students can currently do but rather on what students are capable of doing with the support of others. Vygotsky further highlighted that the developmental levels of two students with the same test results may not necessarily be the same. Each student or the same student at different times has a different zone of proximal development. The teachers or more knowledgeable stakeholders should structure step-by-step help for students according to each student's situation to ensure that students can develop optimally.

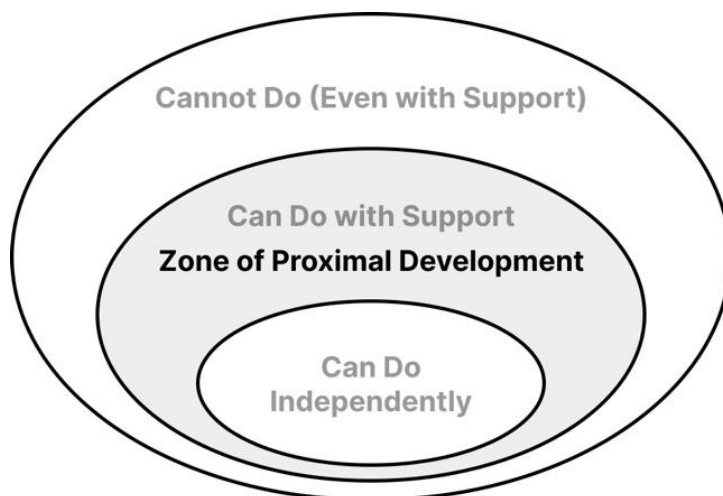


Figure 3. Zone of proximal development.

2.3 Design competency for career development

Design possesses transdisciplinary, substantial and practical qualities. However, the scope and underlying theories of design as a discipline or area of study are somewhat vague (Koskinen et al., 2012; Zimmerman & Forlizzi, 2014). In this context, design competency and specific competencies that must be taught in design education have been discussed in design academia (Conley, 2010; Sudhindra & Blessing, 2021). Fass et al. (2018) defined design competency as a combination of three aspects: design thinking knowledge (cognitive/thinking), doing/making skills (psychomotor/doing) and the behaviour of feelings (affective/feeling). The authors proposed a personalisable design competency framework matrix (Figure 4) that includes 16 categories to identify the competencies that can be acquired during the study of design.

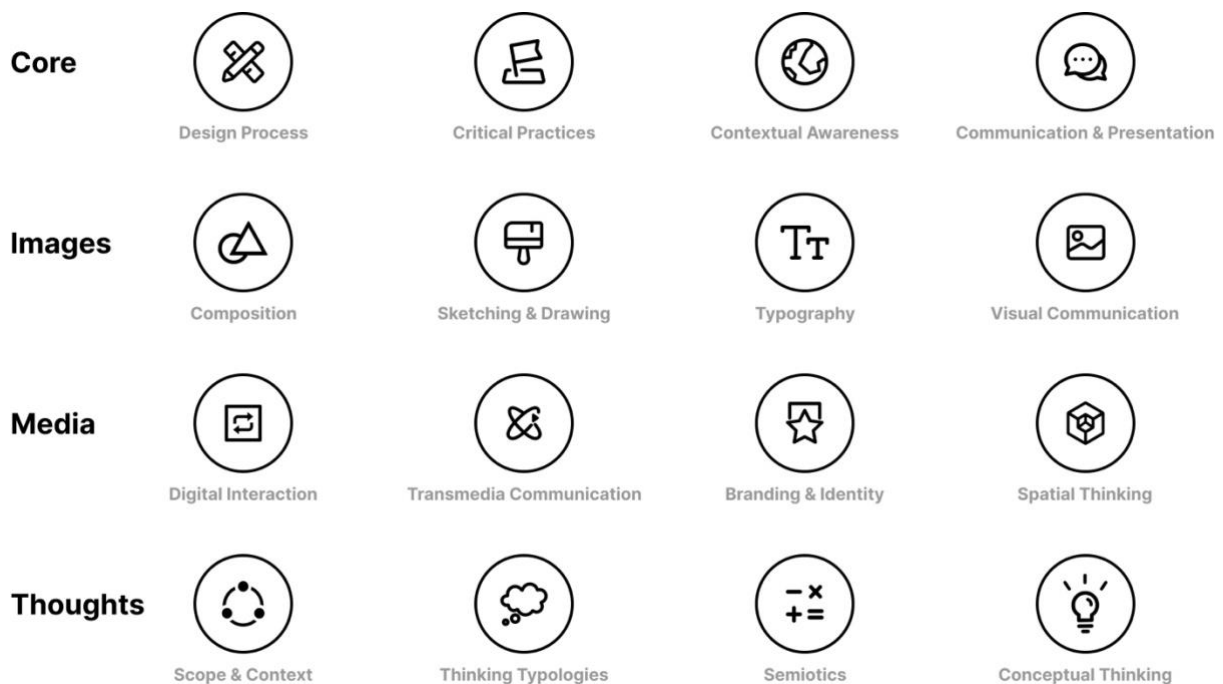


Figure 4. Design competency framework matrix (Fass et al., 2018).

Meyer and Norman (2020) highlighted that the common ground for all design disciplines is their problem-solving way of thinking. Specifically, although design majors vary in the competencies they build in their respective disciplines, design thinking is a core competency that all design students should pursue because design constantly reflects activities that use its outputs to identify, investigate and address real-life problems (Zimmerman & Forlizzi, 2014). Therefore, mastering this thinking competency to tackle problems is important.

The design competencies mentioned above are highly relevant to the essential skills required in today's society and the extended skills needed for the future (Binkley et al., 2012; P21, 2007; World Economic Forum, 2020). Notably, key skills such as innovation, creativity, problem-solving, critical thinking and information and communication technology (ICT)-related literacy are closely related to the competencies required for design. Thus, educating students in design competencies can better address society's current and future requirements.

2.4 Self-efficacy theory and career development of students with SEN

Self-efficacy is a psychological theory that indicates one's belief in one's ability to complete a task or achieve a specific goal (Bandura, 1977). Bandura (1986) claimed that an individual's self-efficacy is influenced by their assessment of what they can do, which is determined by their existing knowledge and skills. Research has shown the relevance of self-efficacy to careers (Betz & Hackett, 2006; Lent & Hackett, 1987). Therefore, expanding one's knowledge and skills may help increase self-efficacy and ultimately benefit career development.

Students with SEN tend to have less self-efficacy than their peers (Clever et al., 1992; Hampton & Mason, 2003) because their experience of more difficulties and failures has led to low self-image and confidence (Yang et al., 2020). However, research has revealed that four sources of efficacy further impact one's self-efficacy (Hampton & Mason, 2003). According to Bandura (1986), the four sources are (1) the result of performance (previous experience), (2) vicarious experience (others serving as models), (3) vocal persuasion (coaching and feedback) and (4) physiological feedback (emotional status). The self-efficacy of students with SEN can be improved by addressing support in these four areas.

3 Career development of graduates with SEN with strengths in art and design in Hong Kong

This section investigates the career development of graduates with SEN in Hong Kong, with a focus on those working in the art and design fields. In the first phase, the employment situation of graduates with SEN in Hong Kong was investigated. In the second phase, news reports highlighting the stories of artists or designers with SEN were selected from the Internet, and the career paths of these individuals were analysed. The factors that contributed to the success of these artists were identified using thematic analysis; the five factors identified were summarised in the final stage.

3.1 Difficult employment situation of graduates with SEN

Hong Kong advocates both integrated education and special education and providing these in parallel (EDB, 2021). Therefore, students with SEN can be enrolled in either ordinary or special schools according to their circumstances. In this context, students with SEN can have the same educational opportunities as their peers during the six years of secondary school studies. However, only a few students with SEN who excel academically can subsequently apply to post-secondary institutions (Kwok, 2023); most students with SEN must enter the job market after secondary school (Kwun Tong Methodist Social Service & Centre for Special Educational Needs and Inclusive Education of The Education University of Hong Kong [KTMS & CSENIE], 2016). Table 1 presents five mainstream pathways for students with SEN after graduation, which were obtained through interviews and field research in section four.

Table 1. Mainstream development pathways for students with SEN graduated from secondary school

Category	Objective
Post-secondary education	To provide opportunities for learning and training in relevant fields.
Open employment/supported employment	To provide vocational training services and independent living training for people with disabilities to facilitate their future open employment.
Sheltered workshop	To provide suitable vocational training for those who cannot enter open employment because of their disabilities. To provide a specially designed training environment to enhance these individuals' work ability and enable them to obtain supported or open employment in the future.
Day activity centre/shine skills centre	To offer day care and instruction in basic job skills and everyday living skills, teaching individuals to be more independent and preparing them for further community integration or for transition to other service or care options.
Care and attention home	To provide residential services to people with serious physical or mental disabilities who cannot participate in training activities during the day.

In Hong Kong, students with SEN who graduate from school to work are generally referred to as persons with disabilities (Hong Kong Census and Statistics Department [HKCSD], 2021). According to the HKCSD (2021), 534,200 persons with disabilities (excluding persons with intellectual disabilities) lived in Hong Kong in 2020, accounting for 7.1% of the overall population of Hong Kong. However, only 17.6% (86,300) of the 490,800 persons with disabilities aged 15 years and older were employed.

Given the constraints of reality, many graduates with SEN do not have suitable employment opportunities that are equivalent to those of their peers (The Hong Kong Federation of Youth Groups, 2018). Many of these students can work exclusively in sheltered workshops or engage in manual labour activities. Even graduates with SEN who have high academic qualifications face employment difficulties. In 2020, 73,100 persons with disabilities had post-secondary education (including non-degree and degree) but only 31,800 were employed (Hong Kong Census and Statistics Department, 2021); only 43.5% of persons with disabilities with high academic qualifications were employed. Therefore, more attention and career planning support should be given to students with SEN. Students should familiarise themselves with their interests and strengths at the secondary school stage to develop their strengths in preparation for an optimal career (The Hong Kong Federation of Youth Groups, 2018).

3.2 Cases of designers and artists with SEN

Although graduates with SEN face a relatively difficult employment situation, several successful cases of designers and artists with SEN were observed. Three cases were selected from online news reports. Two selection criteria were applied: (1) the designer or artist had to have at least one type of SEN and (2) the designer or artist must be a graduate and be employed in a relevant art or design industry. A framework was developed to compare the commonalities and differences in the stories of these cases

by extracting relevant information based on the textual content and filling in the corresponding categories; these patterns are illustrated in Table 2.

Table 2. Cases of designers and artists with SEN

	Case 1 (Wong, 2018)	Case 2 (Wan, 2019)	Case 3 (HK01, 2022)
Occupation	Illustrator	Sand painting artist	Polymer clay artist
Type of SEN	Hearing impairment	Autism and intellectual disability	Autism
Strength/interest	Drawing Concentration	Music Drawing Super memory Concentration	Drawing (line & geometric patterns) Creative Lego building
Why this career	Ability to translate childhood interest into a career Support, affirmation and help from others	Guidance from others Ability to try areas in which he can combine his strengths	Others discovered his talent in polymer clay art Does not enjoy the traditional work of sheltered workshops
Benefits of this career	Brings confidence, happiness and satisfaction	Improves language and social skills Develops a sense of responsibility Gains recognition from others	Improves emotional problems Increases communication skills Allows talent to be displayed Allows enjoyment and pride in career Inspires parents of other people with SEN
Difficulties	Lack of local job opportunities Unstable monthly income Must work harder and better than others to get the opportunity	Must work with the support of others Must make greater effort than others to master sand painting skills	High workload (but willing to do it)
Other tips	Having self-confidence and focusing on developing interests leads to success	With adequate support, training and care, children with special needs can achieve and contribute	Autistic people can have a variety of life choices

First, the three cases were engaged in professions related to their interests or strengths. In case one, the interests/strengths were directly translated into careers, such as those in painting and illustration. In other cases, the future career and interests/strengths partially overlapped; in these situations, interests and strengths played a role in supporting the chosen career. For example, one case illustrated that drawing, musical talent and superb memory were not directly related to but contributed to sand painting. Thus, the interests and strengths of students with SEN are worth appreciating and exploring.

These strengths/interests can lead some individuals directly to future careers, while they can lead others to related industries.

Second, the cases mentioned that although more effort was required to overcome difficulties caused by SEN, SEN also created advantages such as concentration, strong memory and a sharp perception of patterns. Therefore, learning to use the potential strengths conferred by SEN is important.

Third, working in a job one enjoys and in which one excels confers various benefits. Importantly, in addition to the satisfaction and joy of working, work allowed the cases with autism to improve their language and social skills and heal their emotional wounds.

Notably, the three cases emphasised that success cannot be achieved without the support of others. Children often have difficulty recognising their strengths and planning their careers. They need help and affirmation from those around them to discover their interests/strengths, enhance their competencies, plan their lives and have more opportunities to excel.

3.3 Factors that lead to successful career development

The analysis in the previous section revealed commonalities among the three success stories. This section explores the factors that contributed to these individuals' success in pursuing careers they enjoyed and in which they excelled. In each case, thematic analysis was used to identify the key factors that led to success. The news text was coded, the resulting codes were grouped into themes and the data were ultimately synthesised into the five following findings.

1. Discover and enhance interests/strengths,
2. Practice/work in related fields,
3. Seek affirmation and support from others,
4. Ensure a positive attitude and perseverance when facing difficulties, and
5. Showcase work or performance to the public.

4 Art and design education in Hong Kong special schools

The three cases of designers and artists with SEN support the feasibility of translating interests and strengths in art and design into relevant careers. These examples also highlight the importance of support from schools. This section more closely examines the effect of current art and design education on students with SEN and schools' perceptions and actions regarding the future development of this education in the fields of art and design. Two special education schools in Hong Kong were selected as case studies. Field research and expert interviews were conducted to collect first-hand information.

4.1 Introduction to cases

This section analyses the cases of two special schools in Hong Kong. Although one of these schools focuses on intellectual disabilities and the other on physical disabilities, both schools provide art and design education to their students. Table 3 shows basic information on the schools' educational offerings in art and design.

Table 3. General information on two special schools

School	School 1	School 2
Service type	Physical disabilities	Mild intellectual disabilities
Classes	12 classes, including primary and secondary	15 classes, including primary and secondary
Art/design or relevant subjects	Visual art; computer; music	Visual art; computer/ICT; design & technology; music
Art/design related facilities	Visual arts room; computer room; music room; computer-assisted learning room	Design and technology room; music room; visual arts room; makerspace
Other relevant support	Individualised education plan for each student Potential talent development activities (2 classes per week) Career support programme	Life planning education and workshops

4.2 Findings of field research

This section presents the findings of a field research study conducted in the two special schools. A contextual inquiry method including observations and interviews was used to understand the art- and design-related subjects and facilities in the schools. Five students interested in drawing and design were interviewed and discussed their interests, and one student showed her iPad-based drawings.

4.2.1 Well-developed art and design education in special schools

The results showed that art and design are key subjects in the two special schools. The two schools offer a variety of art- and design-related subjects including visual arts, design and technology, computer/ICT and music. The schools further offer individualised art and design education programmes to support students with strengths in related areas. Both schools emphasise the importance of providing opportunities for students to explore their interests/strengths and express themselves.

4.2.2 Informative teaching methods

Teachers use methods such as visual prompting and cueing to facilitate communication with students. Class schedule designs include cartoon characters, and each student's avatar and name are displayed on the class attendance board. In addition, each class size is kept relatively small. During the site visit, each class consisted of less than 10 students, and two teachers were responsible for teaching and conducting classroom activities. The teachers used motivational strategies to encourage positive student behaviour. For example, when a student completed a task, they received a sticker as a reward; 30 stickers could be redeemed for a prize.

4.2.3 Student artwork

The artwork produced by the students from the two special schools (e.g. Figure 5) demonstrated high quality, as evidenced by their use of various techniques and their creative ideas. The five students interviewed were passionate about drawing or related design activities. Some of the students had developed solid drawing skills and were comfortable using digital tools. The students interviewed showed interest in activities related to drawing and design.



Figure 5. The artwork of students from the two special schools visited.

4.3 Expert interviews

Expert interviews were conducted with the principals of the two special schools and a children’s writer who specialises in special education. The discussions were primarily designed to explore the interviewees’ perspectives on supporting the development of students with SEN who have strengths in art and design. In this section, we discuss and analyse the perspectives gathered from the interviews.

4.3.1 Interview with special school principals

The interview with the principals presents support from the school side. Both principals strongly encouraged students to discover their strengths and enhance their abilities. For example, schools supported students to participate in different learning activities, such as workshops and competitions, to explore their interests and showcase themselves. In addition, both schools were actively adopting innovative technologies and concepts, such as virtual reality (VR) and social robots, to further promote students’ development. The principals also mentioned that many graduates with art and design talents had experienced difficulties in finding relevant jobs. To meet the needs of the art and design job market, more support is needed beyond secondary school curricula. They believed that providing students with career planning programs and practical activities is also crucial. These activities enabled students to experience various careers at the secondary school level to ensure that they can pursue a job they enjoy. The principals concluded by stating that they would support students to participate in practical activities organised by art and design professionals.

These findings show that schools welcome new proposals that benefit their students’ personal and professional development. Recommendations related to learning activities, innovative technologies and career-related practices (Figure 6) are in line with the schools’ current educational strategies.

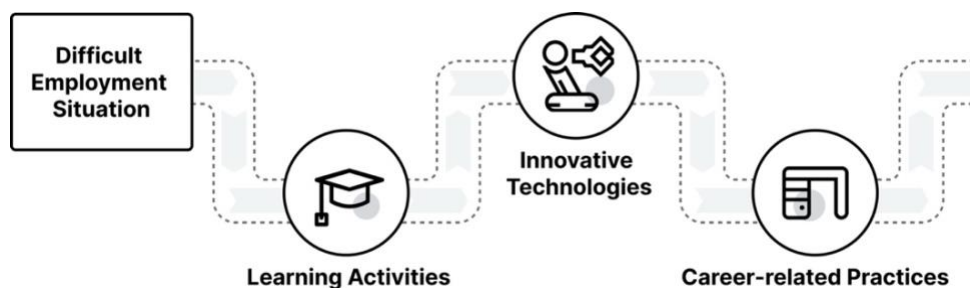


Figure 6. Educational strategies summarised from the interview.

4.3.2 Interview with special education educator and children’s writer

The interview with a special education educator and children’s writer focuses on sharing teaching strategies to inspire the creativity of students with SEN. The interviewee suggested picture books as

learning materials for students with SEN, as the content of picture books can be adapted to the needs of each student. The interviewee also emphasised the importance of providing examples for students to develop ideas. For example, students with autism are more skilled at copying than at drawing creatively. In such cases, the teacher must provide students with design examples for inspiration. Based on the examples, the teacher can ask questions to stimulate students to think in a stepwise fashion rather than directly asking students to draw a specific object. The interviewee believed that schools should support the strengths of students with SEN and guide them in applying their skills to real-life scenarios.

The interviewee's views align with the theory of Vygotsky and Cole (1978), who argued that the learning and development of children occur in the zone of proximal development. To promote creativity, educators must encourage students to think critically and venture beyond their comfort zones. The findings also suggest teaching methods, such as using picture books, design examples, facilitators, and real-life scenarios to stimulate students' creativity (Figure 7).

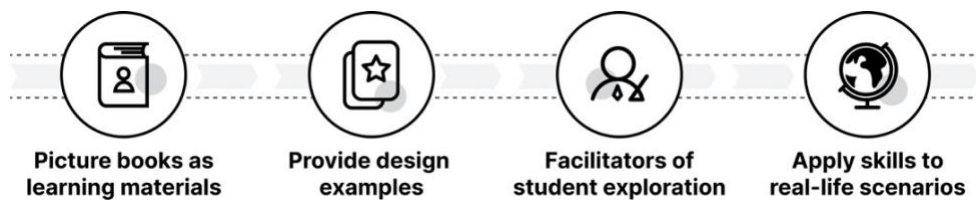


Figure 7. Teaching strategies summarised from the interview.

4.4 Summary

This section concludes that the two schools researched offered art- and design-related subjects and offered art and design classroom facilities. The students' artwork demonstrated a good level of proficiency, and the students expressed their willingness to participate in art and design activities. The school principals and educator supported the students in improving their skills and encouraged them to participate in art and design activities and practices. The principals acknowledged that although some students with SEN show talent in art and design, only a few can pursue related careers. Therefore, early career planning is crucial. In addition, facilitators should help students with SEN develop their creative and critical thinking skills and adopt teaching strategies, such as picture books, design examples, and interactive technology, to deliver enhanced learning experiences and outcomes.

5 Empowering students with SEN through design

The findings from sections three and four indicate that students with SEN who have strengths in art and design face unique challenges in their pathways to pursuing related careers. In addition to physical or learning difficulties, three key challenges were observed.

First, the bar for art and design professions is high. According to the discussion of design competency in section 2.3, good drawing skills are insufficient for pursuing high-level art and design jobs. These jobs require other competencies such as creativity, collaboration, communication, and critical thinking – skills in which students with SEN are relatively less proficient and confident (Tipton, 2019).

Second, students with SEN lack professional practices and career guidance from the art and design fields. Through our research, we learnt that students could participate in career planning activities

such as internships in restaurants arranged by special schools. However, few practical activities were related to the art and design industry.

Finally, a gap exists between workplace requirements and secondary art and design education. This is the most crucial challenge because secondary schools provide significant support for students with SEN for professional development (KTMS & CSENIE, 2016). Although the visual art education in special schools is well-developed, it focuses on improving artistic literacy and personal expression. The design and technology education, on the other hand, focuses on practical skills such as drawing and video editing using digital software. However, as mentioned in the first point above, the requirement for art and design professions continues beyond there. These design-related competencies required for the workplace are generally developed at the higher education level; however, not all students with SEN can apply for further education (Kwok, 2023). Therefore, a student in secondary school with a talent for drawing is likely to face difficulty finding work directly related to their skills after graduation.

Addressing these challenges requires a holistic approach that considers not only students' strengths in art and design but also their learning styles, career planning, design-related competencies and self-efficacy. These considerations align closely with the social model of disability and neurodiversity, as it values differences and aims to teach students to realise their potential on their terms (Armstrong, 2012). It is also in line with the conclusion we reached when investigating the cases of the artists that SEN also creates advantages such as concentration, strong memory and a sharp perception of patterns. Therefore, learning to use the potential strengths conferred by SEN is important.

One possible solution is to provide students with a series of project-based design sessions that transform their art and design strengths into design competencies that are better suited to the job market (see Figure 8). This model should incorporate the educational and teaching strategies summarised in section four to provide students with a positive and inclusive learning experience. Given that today's design problems are far more complicated and interdisciplinary (Norman, 2011), engaging students in complete design projects allow them to develop more comprehensive competencies (Benton & Johnson, 2015; Iivari & Kinnula, 2018; Kinnula & Iivari, 2019). In addition, design projects must be based on actual needs and final design outputs must be useable in real life. Through this experiential learning, students can learn and reflect by doing. By the end of the project, students can generate a design portfolio that can be useful for their careers or applications to design-related institutions. As they gain more knowledge and skills, experience success and receive encouragement and recognition from others, students' self-efficacy can be enhanced through this process (Bandura, 1986).

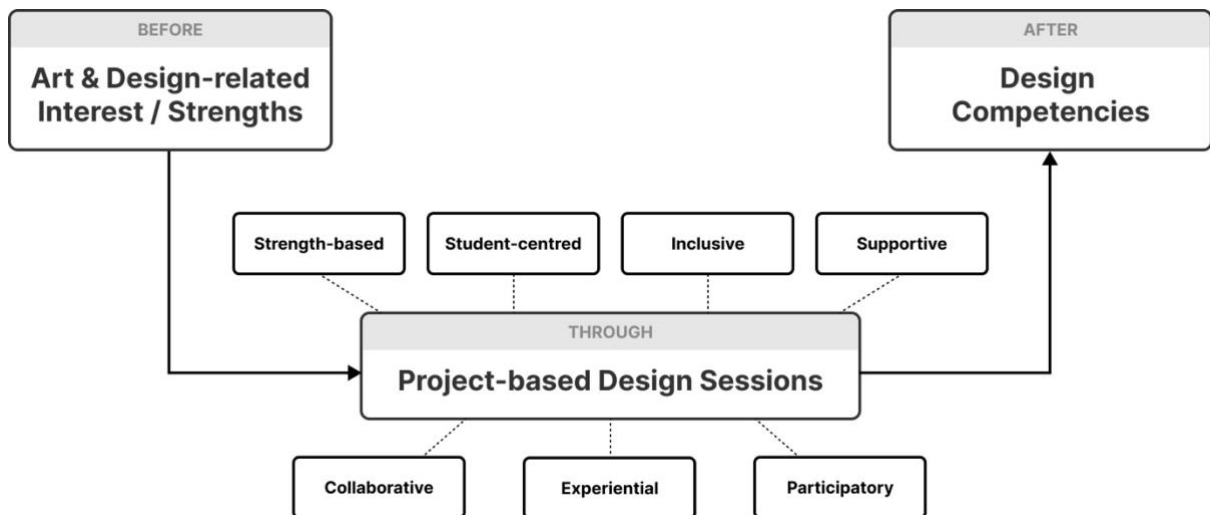


Figure 8. A model of transforming art- and design-related strengths into design competencies

The following are the main principles of the proposed design sessions for students with SEN who have strengths in art and design.

- Student-centred: Design sessions should be tailored to each student’s learning style and art and design interests and provide students with design roles to help them explore and develop their strengths.
- Strength-based: Design sessions should be developed with a strength-based strategy, which is not mandatory for every student with SEN but only for those with relevant interests and strengths.
- Collaborative: Design sessions should provide a collaborative environment that encourages students to share ideas and learn from one another. Each student should assume a portion of the work based on their area of strength.
- Experiential: Design sessions should provide hands-on learning experiences that allow students to use design thinking to solve problems.
- Participatory: Design sessions should follow a participatory approach, with students with SEN acting as design partners and researchers acting as facilitators to design artefacts that serve students with SEN.
- Supportive: Design sessions should provide a supportive and encouraging atmosphere that fosters students’ self-efficacy and self-confidence and ensures a positive learning experience.
- Inclusive: Design sessions should be inclusive and accessible to students with different types of SEN. Teaching methods and settings should be carefully planned and should require the consent of schools and parents.

6 Conclusion

This study explored the potential of enhancing the art and design strengths of students with SEN and converting these strengths into relevant design competencies that can guide future career planning. The paper begins by reviewing key concepts pertaining to students with SEN, teaching and learning theory, design competency and self-efficacy theory. Additionally, the paper investigates the

employment situation of graduates with SEN in Hong Kong and analyses the factors that contribute to the success of artists and designers with SEN. This study explores the effects of art and design education on students using field research and expert interviews in two special schools. Ultimately, the paper proposes a solution by conducting project-based design sessions for students with SEN who have strengths in art and design.

The proposed solution can have a significant impact on the lives and career development of students with SEN who have strengths in art and design. Through consideration of not only their art and design strengths but also their learning styles, career plans, design-related competencies, and self-efficacy, students with SEN can be helped in reaching their full potential and contributing to the art and design industries.

This study has selected Hong Kong as a case study because its well-developed special education system represents a unique combination of Eastern and Western cultures. This choice enriches our perspective and provides us with opportunities to collaborate with international scholars. In addition, the bilingual nature of Hong Kong makes it easier for us to translate our research findings into Chinese and English, paving the way for future applications globally.

However, we must acknowledge that more research is needed globally to explore the effectiveness of this approach and to identify the best practices for empowering students with SEN who are gifted in art and design. It's also important to note that the factors leading to successful career development in art and design were drawn from online news reports data. Due to the reports' narrative limitations and the small sample size, the study may have some limitations and overlooked factors, such as the socio-economic conditions of the artists. Future research should incorporate these factors to gain a more comprehensive understanding of the topic.

References

- Alter-Muri, S. B. (2017). Art Education and Art Therapy Strategies for Autism Spectrum Disorder Students. *Art Education, 70*(5), 20–25. <https://doi.org/10.1080/00043125.2017.1335536>
- Armstrong, T. (2012). *Neurodiversity in the Classroom: Strength-Based Strategies to Help Students with Special Needs Succeed in School and Life*. ASCD.
- Bandura, A. (1977). Self-Efficacy: Toward a Unifying Theory of Behavioral Change. *Psychological Review, 84*(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Bandura, A. (1986). Fearful Expectations and Avoidant Actions as Coeffects of Perceived Self-Inefficacy. *American Psychologist, 41*(12), 1389–1391. <https://doi.org/10.1037/0003-066X.41.12.1389>
- Benton, L., & Johnson, H. (2015). Widening participation in technology design: A review of the involvement of children with special educational needs and disabilities. *International Journal of Child-Computer Interaction, 3–4*, 23–40. <https://doi.org/10.1016/j.ijcci.2015.07.001>
- Benton, L., Vasalou, A., Khaled, R., Johnson, H., & Gooch, D. (2014). Diversity for design: A framework for involving neurodiverse children in the technology design process. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 3747–3756. <https://doi.org/10.1145/2556288.2557244>
- Betz, N. E., & Hackett, G. (2006). Career Self-Efficacy Theory: Back to the Future. *Journal of Career Assessment, 14*(1), 3–11. <https://doi.org/10.1177/1069072705281347>
- Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., Miller-Ricci, M., & Rumble, M. (2012). Defining Twenty-First Century Skills. In P. Griffin, B. McGaw, & E. Care (Eds.), *Assessment and Teaching of 21st Century Skills* (pp. 17–66). Springer Netherlands. https://doi.org/10.1007/978-94-007-2324-5_2
- Bossavit, B., & Parsons, S. (2018). Outcomes for design and learning when teenagers with autism codesign a serious game: A pilot study. *Journal of Computer Assisted Learning, 34*(3), 293–305. <https://doi.org/10.1111/jcal.12242>

- Bowler, L., Large, A., Beheshti, J., & Nasset, V. (2005). Children and Adults Working Together in the Zone of Proximal Development: A Concept for User-Centered Design. *Proceedings of the Annual Conference of CAIS / Actes Du Congrès Annuel de l'ACSI*. <https://doi.org/10.29173/cais273>
- Brosnan, M. J. (2019, May 16). *Digital autism: Participatory design and the autistic community* [Conference presentation]. Autism and Technology Conference, London, United Kingdom. <https://www.youtube.com/watch?v=3wuXeTRdeHQ>
- Chaiklin, S. (2003). The Zone of Proximal Development in Vygotsky's Analysis of Learning and Instruction. In A. Kozulin, B. Gindis, V. S. Ageyev, & S. M. Miller (Eds.), *Vygotsky's Educational Theory in Cultural Context* (1st ed., pp. 39–64). Cambridge University Press. <https://doi.org/10.1017/CBO9780511840975.004>
- Clarkson, P. J., Coleman, R., Keates, S., & Lebbon, C. (2013). *Inclusive Design: Design for the Whole Population*. Springer Science & Business Media.
- Clever, A., Bear, G., & Juvonen, J. (1992). Discrepancies Between Competence and Importance in Self-Perceptions of Children in Integrated Classes. *The Journal of Special Education, 26*(2), 125–138. <https://doi.org/10.1177/002246699202600201>
- Colorosa, S. R., & Makela, C. J. (2014). Integrative Literature Review: Styles of Learning for Autism Spectrum Disorders and Human Resource Development: Informing Performance Management. *International Journal of Business and Social Science, 5*(13).
- Conley, C. (2010). Leveraging Design's Core Competencies. *Design Management Review, 3*(3), 45–51. <https://doi.org/10.1111/j.1948-7169.2004.tb00171.x>
- Constantino, C. (2018). What Can Stutterers Learn from the Neurodiversity Movement? Seminars in Speech and Language, 39(04), 382–396. <https://doi.org/10.1055/s-0038-1667166>
- Conti, G. J. (2009). Development of a User-Friendly Instrument for Identifying the Learning Strategy Preferences of Adults. *Teaching and Teacher Education, 25*(6), 887–896. <https://doi.org/10.1016/j.tate.2009.02.024>
- Department for Education & Department of Health. (2015). *Special Educational Needs and Disability Code of Practice: 0 to 25 Years: Statutory Guidance for Organisations Which Work with and Support Children and Young People who Have Special Educational Needs or Disabilities*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/398815/SEND_Code_of_Practice_January_2015.pdf
- Escaño, C., Maeso-Broncano, A., & Mañero, J. (2021). Art Education and Development Cooperation: A Project in Educational Centres for Children with Special Needs in India. *International Journal of Art & Design Education, 40*(2), 404–419. <https://doi.org/10.1111/jade.12358>
- Fass, J., Rutgers, J., & Chui, M. (2018) Using Design Competencies to Define Curricula and Support Learners, In Storni, C., Leahy, K., McMahon, M., Lloyd, P. and Bohemia, E. (Eds.), *Design as a catalyst for change - DRS International Conference 2018*, 25-28 June, Limerick, Ireland. <https://doi.org/10.21606/drs.2018.578>
- Fleming, N. D., & Mills, C. (1992). Not Another Inventory, Rather a Catalyst for Reflection. *To Improve the Academy, 11*(1), 137–155. <https://doi.org/10.1002/j.2334-4822.1992.tb00213.x>
- Fung, S. K., & Lan, Y. (2018). Post-school Transition of Students with Special Educational Needs in Hong Kong. In M. Pavlova, J. C.-K. Lee, & R. Maclean (Eds.), *Transitions to Post-School Life: Responsiveness to Individual, Social and Economic Needs* (pp. 183–195). Springer. https://doi.org/10.1007/978-981-10-6476-0_11
- Gurney, P. W. (2018). *Self-Esteem in Children with Special Educational Needs*. Routledge. <https://doi.org/10.4324/9780429503627>
- Hampton, N. Z., & Mason, E. (2003). Learning Disabilities, Gender, Sources of Efficacy, Self-Efficacy Beliefs, and Academic Achievement in High School Students. *Journal of School Psychology, 41*(2), 101–112. [https://doi.org/10.1016/S0022-4405\(03\)00028-1](https://doi.org/10.1016/S0022-4405(03)00028-1)
- Heiman, T., & Olenik-Shemesh, D. (2020). Social-Emotional Profile of Children with and without Learning Disabilities: The Relationships with Perceived Loneliness, Self-Efficacy and Well-Being. *International Journal of Environmental Research and Public Health, 17*(20), 7358. <https://doi.org/10.3390/ijerph17207358>
- Hermon, A., & Prentice, R. (2003). Positively Different: Art and Design in Special Education. *International Journal of Art & Design Education, 22*(3), 268–280. <https://doi.org/10.1111/1468-5949.00364>
- HK01. (2022, Dec. 8). 自閉症藝術家盧業能 創作軟陶逾 17 年 第三次個展分享快樂 [Autistic artist Lo Yip-nang has been creating polymer clay art for over 17 years and is sharing his happiness in his third

- exhibition]. <https://www.hk01.com/社會新聞/844274/自閉症藝術家盧業能-創作軟陶逾 17 年-第三次個展分享快樂>
- Hong Kong Census and Statistics Department. (2021). *Special Topics Report No. 63: Persons with Disabilities and Chronic Diseases*. https://www.censtatd.gov.hk/en/data/stat_report/product/B1130121/att/B11301632021XXXXB0100.pdf
- Hong Kong Education Bureau. (2021). *Types of Special Educational Needs. Integrated Education and Special Education Information Online*. <https://sense.edb.gov.hk/en/types-of-special-educational-needs/index.html>
- Hong Kong Education Bureau. (2021). *Special Education*. <https://www.edb.gov.hk/en/edu-system/special/index.html>
- Hong Kong Education Bureau. (2022). *Student Enrolment Statistics, 2021/22 (Kindergartens, Primary and Secondary Schools)*. https://www.edb.gov.hk/attachment/en/about-edb/publications-stat/figures/Enrol_2021.pdf
- Hong Kong Society for Community Organization (SoCO). (2019). *SEN Children and Caregivers Needs: Survey Report*. https://soco.org.hk/wp-content/uploads/2014/10/SEN_兒童及照顧者問卷調查20191213finalized.pdf
- Horvath-Rose, A. E., Stapleton, D. C., & O'Day, B. (2004). Trends in outcomes for young people with work disabilities: Are we making progress? *Journal of Vocational Rehabilitation, 21*(3), 175–187.
- Kinnula, M., & Iivari, N. (2019). Empowered to Make a Change: Guidelines for Empowering the Young Generation in and through Digital Technology Design. Proceedings of the FabLearn Europe 2019 Conference, 1–8. <https://doi.org/10.1145/3335055.3335071>
- Kolb, D. A. (1984). *Experiential Learning: Experience as the Source of Learning and Development*. Prentice-Hall.
- Koskinen, I., Zimmerman, J., Binder, T., Redstrom, J., & Wensveen, S. (2011). *Design research through practice: From the lab, field, and showroom*. Elsevier. <https://doi.org/10.1016/C2010-0-65896-2>
- Kwok, X. (2023, Jul. 24). *DSE / SEN 考生年增 13% 去年 696 人獲「33222」讀大學比例是？ [13% annual increase in SEN students taking DSE exams. Last year 696 people received "33222". What is the percentage of them obtaining university admission?]*. HK 01. https://www.hk01.com/研數所/921493/dse-sen_考生年增 13-去年 696 人獲-33222-讀大學比例是
- Kwun Tong Methodist Social Service & Centre for Special Educational Needs and Inclusive Education of The Education University of Hong Kong. (2016). Career Orientation and Career Development Efficacy for Students with Special Educational Needs (SEN). <https://www.ktmss.org.hk/wp-content/uploads/2016/11/「有特殊學習需要學生的職業導向及職業發展效能感」調查報告2016.pdf>
- Lent, R. W., & Hackett, G. (1987). Career Self-Efficacy: Empirical Status and Future Directions. *Journal of Vocational Behavior, 30*(3), 347–382. [https://doi.org/10.1016/0001-8791\(87\)90010-8](https://doi.org/10.1016/0001-8791(87)90010-8)
- Iivari, N., & Kinnula, M. (2018). Empowering children through design and making: Towards protagonist role adoption. Proceedings of the 15th Participatory Design Conference: Full Papers - Volume 1, 1–12. <https://doi.org/10.1145/3210586.3210600>
- Meyer, M. W., & Norman, D. (2020). Changing Design Education for the 21st Century. *She Ji: The Journal of Design, Economics, and Innovation, 6*(1), 13–49. <https://doi.org/10.1016/j.sheji.2019.12.002>
- Norman, D. (2011). Wir brauchen neue Designer! Why Design Education Must Change. *Form: The Making of Design, 92–95*.
- Parsons, S. (2016). Authenticity in Virtual Reality for assessment and intervention in autism: A conceptual review. *Educational Research Review, 19*, 138–157. <https://doi.org/10.1016/j.edurev.2016.08.001>
- P21. (2007). *Maximising the Impact: The Pivotal Role of Technology in a 21st Century Education System*. <http://www.p21.org/documents/p21setdaistepaper.pdf>
- Rosqvist, H. B., Chown, N., & Stenning, A. (2020). *Neurodiversity Studies: A New Critical Paradigm*. Routledge.
- Sudhindra, S. T., & Blessing, L. T. M. (2021). A Framework For Design Competency Assessment. *Proceedings of the Design Society, 1*, 91–100. <https://doi.org/10.1017/pds.2021.10>

- The Hong Kong Federation of Youth Groups. (2018). *Enhancing Career Opportunities for Higher Educated Youth with SEN or Disabilities*. https://yrc.hkfyg.org.hk/wp-content/uploads/sites/56/2018/11/YI036_report.pdf
- Tipton, J. M. (2019). *Twenty-First Century Skill Building for Students With Special Needs Through Problem-Based Learning: An Examination Of Homeschool Teacher Blogs* (Doctoral dissertation). <https://scholarworks.waldenu.edu/dissertations/7512>
- Tohara, A. J. T., Shuhidan, S. M., Bahry, F. D. S., & Nordin, M. N. bin. (2021). Exploring Digital Literacy Strategies for Students with Special Educational Needs in the Digital Age. *Turkish Journal of Computer and Mathematics Education (TURCOMAT)*, 12(9), Article 9. <https://doi.org/10.17762/turcomat.v12i9.5741>
- United Nations Educational, Scientific and Cultural Organization. (2011). *International Standard Classification of Education ISCED 2011*. <https://uis.unesco.org/sites/default/files/documents/international-standard-classification-of-education-isced-2011-en.pdf>
- Vygotsky, L. S., & Cole, M. (1978). *Mind in Society: Development of Higher Psychological Processes*. Harvard University Press.
- Wan, O. (2019, Feb. 8). 殊 · 不絕望 自閉智障兒成沙畫家 媽媽：特殊兒一樣可以有成就 [Special, not desperate: Autistic mentally impaired child becomes sand painting artist, Mother: special children can also have achievements]. Ohpama. <https://www.ohpama.com/383864/親子教養/親子教養/殊 · 不絕望-自閉智障兒成沙畫家-媽媽：特殊兒>
- Wong, Y. (2018, Nov. 23). 突破無聲障礙靠讀唇語修畢碩士 80 後失聰插畫師：聽障令我畫畫更專心(有片) [Breaking through the silent barrier by reading lips to complete a master's degree, Post-80s illustrator with hearing impairment: Hearing impairment makes me more focused on painting (with video)]. Hong Kong Economic Times. <https://topick.hket.com/article/2208389?r=cpsdlc>
- World Economic Forum. (2020). *The Future of Jobs Report 2020*. https://www3.weforum.org/docs/WEF_Future_of_Jobs_2020.pdf
- Yang, L., Yuen, M., Wang, H., Wang, Z., & Sin, K. F. (2020). Assessing Career Life Skills Self-Efficacy of Students with Special Educational Needs: A Comparative Study in Hong Kong. In M. Yuen, W. Beamish, & V. S. H. Solberg (Eds.), *Careers for Students with Special Educational Needs: Perspectives on Development and Transitions from the Asia-Pacific Region* (pp. 313–326). Springer Nature. https://doi.org/10.1007/978-981-15-4443-9_21
- Yang, L., Sin, K. F., & Savickas, M. L. (2023). Assessing factor structure and reliability of the career adaptability scale in students with special educational needs. *Frontiers in Psychology*, 14. <https://www.frontiersin.org/articles/10.3389/fpsyg.2023.1030218>
- Zimmerman, J., & Forlizzi, J. (2014). Research Through Design in HCI. In J. S. Olson & W. A. Kellogg (Eds.), *Ways of Knowing in HCI* (pp. 167–189). Springer. https://doi.org/10.1007/978-1-4939-0378-8_8

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