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Young Students' Aesthetic Literacy and Online Usage During COVID-19 in Taiwan

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ABSTRACT

Digital learning has been prevalent in both pre- and during the COVID-19 pandemic. Research suggests that mental health problems in young people have been exacerbated by COVID-19, possibly related to a lack of social connection. Young people spend more time on using the internet for either study or connecting with their peers.

The United Nations Organization for Economic Cooperation and Development (OECD) proposed the "OECD Future of Education and Skills 2030 project", which directly addresses the unpredictable situation with the future trend. Students not only need to develop knowledge and skills, but also develop attitudes and values. Creating new value requires critical thinking and creativity to find different solutions to problems and collaborate with others to find solutions to complex problems.

STEAM (Science, Technology, Engineering, Arts, Math) education action has been valued. In 2011, President Obama proposed the importance of innovation, technology, and education and issued "A blueprint for reform: The reauthorization of the elementary and secondary education act." Inter order to promote STEM courses, US$3.1 billion had been invested in 2014. STEM is the 4-letter abbreviation of Science, Technology, Engineering and Math, which is an emerging educational issue that combines the four professional fields of science, technology, engineering and mathematics.

The Rhode Island School of Design in the United States launched the "from STEM to STEAM" movement, which gradually spread among the private sector, local governments and education in various countries.

Scholar in Hong Kong reviewed existing literature on STEAM courses and summarized two views on A: 1. ART = visible beauty, 2. ART = design thinking. Researchers and experts with art and communication media backgrounds believe that the most effective entry point for STEAM is to combine technology, science and art from the perspective of design.

In the process of solving problems, design gives a clear purpose to the integration of art, technology, and science. Problem-solving is the commonality between STEM and ARTS that are closely connected. The problem-solving of STEM is based on practicality, while that of ARTS is based on creativity. The ability of expression is the main focus.

The Curriculum Guidelines of 12 Year Basic Education in Taiwan emphasize literacy-oriented teaching and cultivates students' knowledge, abilities, and attitudes through 12 years of national education. One of the core competencies is "artistic literacy and aesthetic literacy," which is an important part of "communication and interaction." However, most parents expect children to study further education. The teaching time of art-related courses or education are often borrowed from those of mathematics, science, and Chinese classes, which invisibly deprives young students of the opportunity to live an aesthetic life.

The impact of the epidemic on life has also highlighted the value of digital learning and video conferencing. With their intensive online schedules, are young students also exposed to various aesthetic experiences through digital platforms? What are the online trends and aesthetic literacy of young students in Taiwan?

Introduction

Digital learning has been prevalent both pre- and during the COVID-19 pandemic. Research suggests that mental health problems in young people have been exacerbated by COVID-19, possibly due to a lack of social connection [1]. Young people are spending more time using the internet, either for study or connecting with their peers.

The United Nations Organization for Economic Cooperation and Development (OECD) introduced the "OECD Future of Education and Skills 2030 project", addressing unpredictable situations and future trends. Students need to develop not only knowledge and skills but also attitudes and values. Creating new value requires critical thinking and creativity to discover different solutions to problems and collaborate with others in finding solutions to complex issues [2].

The importance of STEAM (Science, Technology, Engineering, Arts, Math) education has been recognized. In 2011, President Obama stressed the significance of innovation, technology, and education, issuing "A Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act." To promote STEM courses, US$3.1 billion was invested in 2014. STEM, a four-letter abbreviation for Science, Technology, Engineering, and Math, represents an emerging educational trend that combines these four professional fields.

The Rhode Island School of Design in the United States initiated the "from STEM to STEAM" movement, which has since gained traction among the private sector, local governments, and educational institutions in various countries [3]. Scholars in Hong Kong have reviewed existing literature on STEAM courses, identifying two views on "A": 1. ART = visible beauty 2. ART = design thinking [4]. Researchers and experts with backgrounds in art and communication media believe that the most effective entry point for STEAM is to merge technology, science, and art from a design perspective [5-7].

In problem-solving, design gives a clear purpose to the integration of art, technology, and science. Problem-solving is a common thread between STEM and ARTS. While STEM focuses on practicality, ARTS emphasizes creativity. The primary focus lies in the ability to express [4].

The Curriculum Guidelines of 12-Year Basic Education in Taiwan stress literacy-oriented teaching and aim to cultivate students' knowledge, abilities, and attitudes through 12 years of national education. A core competency is "artistic literacy and aesthetic literacy," a crucial aspect of "communication and interaction." However, many parents hope for their children to pursue higher education, leading to a reduction in teaching time for art-related courses. Time is often borrowed from subjects like mathematics, science, and Chinese classes, indirectly depriving young students of opportunities to experience an aesthetic life.

The pandemic has underscored the value of digital learning and video conferencing. Given their intensive online schedules, are young students gaining aesthetic experiences through digital platforms? What are the online usage and aesthetic literacy of young students in Taiwan?

Literature Review
Concept of Aesthetics
The French sculptor Auguste Rodin once said "Beauty is everywhere. It is not that she is lacking to our eye, but our eyes which fail to perceive her." Beauty exists around us in our daily lives and can stir our thoughts, evoke inner feelings or emotions. The key lies in our awareness of the beauty around us.

In short, "beauty" refers to something that exists in all things, capable of moving our thoughts, with principles of beauty that can be explained or other indescribable internal emotions, which call beauty.

The term "aesthetic" originates from the Greek word "aisthetikos," meaning the study of sensory perception. It was introduced by the German philosopher Baumgarten and refers to the philosophical study of the perception, senses, and the beauty of nature or art [8]. The connotation of "aesthetic" encompasses "appreciation of beauty," "aesthetic judgment," and "the study of aesthetics" [9]. Aesthetics can be defined as the pleasurable sensation evoked in a subject by an object that possesses the characteristics of beauty. The subject refers to the individual, while the object exists in various forms [4].

Aesthetics is understood as a mental state involving the concept of aesthetic experience, which occurs when we adopt a certain stance in response to objects/people/texts [10]. Dewey in his foundational work on aesthetic experience, explored how people give meaning to their environment through various interactions. He believed that encounters with art encourage students to communicate different dimensions of reality through different modes of meaning [11]. Dewey differentiated aesthetic experiences from ordinary experiences by noting a certain emotional response, something we feel inside. The self-awareness may influence people's perception and feeling. These experiences can be felt in all dimensions of life and require specific conditions to occur.

"Aesthetic education" emerged in the 18th century. The German poet and philosopher Schiller stated that aesthetic education is the only path to harmoniously develop the dynamics of sensuality, rationality, and spirituality, and thus create a perfect personality and establish a harmonious society [12]. This implies that beauty is not limited to the external aesthetics of visual art, but also includes personal inner cultivation and the beauty of interactions with society and others. The selfawareness stimulate one's concern and observation.

New literacy studies, initially proposed by James Gee and Brian Street, represent a critical approach to observing how people understand and create different types of texts under various cultural and social construction conditions [13-14]. It takes individuals living environment, communication technology and the process of their socialization into consideration. This way of thinking considers literacy education more as a critical social practice, where students question texts rather than acquiring literacy skills to conform in society [15]. New literacy studies encourage individuals to actively engage in learning, with the ultimate goal of questioning and potentially changing the prevailing standard in their surroundings [16]. Communication technologies usually are applied in classroom management, which seems be regarded as a tool to promote students' learning interest.

New literacy studies have influenced research in many areas of literacy, as well as subsequent semiotics and assessment theories based on sociocultural perspectives [17]. Such literacies are often seen as hybrid and/or place-based literacies, including those encountered in families, communities, and schools [18-20]. Existing new literacy studies focus on the interactions and exchanges between teachers and students in classrooms, and the literacy development they provoke. It seems that that teachers' skills such as computer skills, psychological and pedagogy may influence learners' thinking ability, creativity and IT skills, etc [21].

As the progress of internet innovation, social networks have been one of the influential communities in information society. During the pandemic, when these situations are centered around the internet, is there any impact upon individuals' aesthetic experiences?

The development of education in Taiwan has been significantly influenced by policies and reforms. According to the Primary and Junior High School Act, enacted in 1979, the purpose of primary and junior high school education is to foster the sound moral, cognitive, physical, social, and aesthetic development of the citizens. Aesthetic education was highlighted as one of these five key areas. In 1980, the Ministry of Education emphasized the role of aesthetic education in promoting balanced development in moral, intellectual, physical, and social dimensions, and in enhancing their realms and enriching their content, through the "Guidelines for Strengthening Aesthetic Education in National Primary and Secondary Schools".

However, under an education system dominated by subject focus and a culture of examination, aesthetic education has often been overlooked, sometimes even sacrificed under the pressure of other subject teaching hours.

In 1993, the goals for Arts and Crafts in the new primary school curriculum included three major objectives: "expression", "aesthetic appreciation", and "practice and application":
1. Expression: Using various artistic mediums to experience the joy of creation and cultivate expressive abilities.
2. Aesthetic Appreciation: Through aesthetic activities, recognizing the value of art and enhancing aesthetic literacy.
3. Practice and Application: Applying art and integrating life and technology skills to cultivate a sense of beauty and enhance the quality of life [22].

This included teaching children to distinguish between natural and hand-made visual elements, understanding principles of beauty, developing keen perception and the ability to appreciate beauty, and applying artistic knowledge in daily life [23]. The revised curriculum standards at this stage reflect a shift towards emphasizing emotional dimensions in art education, cultivating basic aesthetic abilities, and applying aesthetic education in life.

The Grade 1-9 Curriculum Guidelines in 2003 outlined goals for the arts and humanities field divided into three parts: "exploration and expression", "aesthetic understanding", and "practice and application" [24]. Compared to the 1993 curriculum, these objectives remained largely consistent, emphasizing the interaction between students and their environment in art education, beyond just artistic creation abilities, and cultivating students' ability to understand and appreciate culture and arts, making art teaching not just a hands-on subject but also one requiring thoughtful judgment and understanding, as well as heartfelt engagement with the environment.

Exploring these curriculum goals, it is clear that the ultimate purpose of art education is not limited in artistic creation but also including the appreciation and feeling of beauty, to enrich life and spirit, highlighting the fundamental importance of aesthetic education.

With changing times and societal evolution, policy revisions gradually implemented K-12 education, centering on "core competencies", including three main dimensions: autonomy, communication, and social participation. These are further divided into nine items, with "Artistic Cultivation and Aesthetic Literacy" being one of them. This implies that courses across all fields should meet the requirement of having "artistic perception, creation, and appreciation abilities, experiencing the beauty of art and culture, reflecting on the aesthetics of life, enriching aesthetic experiences, and cultivating an attitude and ability to appreciate, construct, and share the beauty in good people and things [25].

The draft of the K-12 educational curriculum guidelines revised the goals of the art field to be achieved through three learning dimensions: expression, appreciation, and practice:
1. Expression: Skillfully using media and forms for artistic creation and presentation, conveying thoughts and emotions.
2. Appreciation: Through participating in aesthetic activities, developing sensitivity and understanding, recognizing the value of art.
3. Practice: Cultivating active participation in the arts, promoting a life of beauty and goodness [26].

Additionally, in recent years, the Ministry of Education has launched the "Long-Term Plan for Aesthetic Education: The First Five-Year Plan (2013-2017)", the first major development policy formulated by the government in this field. The plan had three objectives:
1. Sowing Aesthetics: Strengthening curriculum and teaching, enhancing educators' aesthetic knowledge and abilities.
2. Establishing Aesthetic Foundations: Constructing support systems for aesthetic learning and activating related resources.
3. Popularizing Aesthetics: Creating aesthetic environments and cultivating localized aesthetic identity and uniqueness [27].

As Scholar Han said, the 21st century is the century of aesthetics, and aesthetics is a form of competitiveness. The power of beauty is not to be overlooked, and this policy hopes to achieve "A Nation of Beauty, A Beautiful Homeland, A Good Society", starting by enhancing the aesthetic literacy of the citizens. Aesthetic education needs long-term and sustained attention. The formulation of aesthetics starts from individuals' self-awareness, and then expanding to their connection with the environment and others.

Cultivation of Aesthetic Literacy
The term "aesthetic literacy" combines 'literacy', which signifies 'knowledge', 'ability', and 'attitude', all essential for an individual's holistic development [28]. Bloome pointed out that before the 1980s, 'literacy' was simply defined as encoding and decoding of texts, implying that traditionally literacy mostly referred to reading, writing, or arithmetic abilities [29]. The concept of literacy evolves over time and varies with changes in politics, economy, society, environment, and technology [30]. In the context of research, literacy is defined as the ability to apply knowledge in real-life situations to address problems or challenges. Tsai emphasized that literacy is not just about knowledge or skills; attitudes are equally crucial, forming a significant factor in curriculum reform. Hence, the 2014 'Guidelines of the 12Year Basic Education Curriculum' in Taiwan highlighted 'core competencies' as the knowledge, abilities, and attitudes necessary for adapting to present and future challenges.

Aesthetic literacy focuses on cultivating sensitivity and responsiveness to everything around us in life. Wu analyzed from an educational perspective that the focus of aesthetic experience is on the degree of perceptual concern and sensitivity [31]. When an individual's sensitivity and potential for feeling and being moved by external things increase, beauty becomes omnipresent, extending beyond just art, as one can see and discover beauty independently. At this point, whether an individual can analyze color, composition, understand principles of symmetry, balance, or even recognize art movements and artists' names, becomes less critical.

Empirical studies on aesthetic literacy typically involve adopters' perspective, including the general public (including campus administrative staff), school teachers, students, etc. Besides examining theories, these studies also offer practical suggestions for aesthetic education and curriculum design in communities or campuses.

Surveys on aesthetic literacy among the general public include Huang's survey on the aesthetic literacy of administrative staff at a national university, revising and summarizing the dimensions of aesthetic measurement from the "Aesthetic Research" questionnaire to construct a scale suitable for the public [32]. Based on cognition and behavior, divided the aesthetic literacy of school administrative leaders into 'attitude towards participation in the arts' and 'attitude towards the arts'. Chen found in her research project 'Development of Aesthetic Literacy among Taiwanese People and Improvement of Art Education' that the aesthetic literacy of Taiwanese people needs enhancement [33]. Wu conducted related research on the development of aesthetic literacy among Taiwanese people and improvements in art education [34].

Personal Background and Aesthetics
According to several empirical research, the cultivation of aesthetic literacy seems to be affected by one's learning stage, family education, gender as well as living surroundings. From an educational standpoint, studies on students' aesthetic literacy include Pan's research on the aesthetic literacy of junior high and primary school students and related factors [35]. The study targeted sixth graders and first-year junior high students in Taipei, discovering that students lacked the willingness to participate or the habit of practicing, with primary students showing better aesthetic literacy than junior high students. The main factors influencing students' aesthetic literacy were interest, family activity habits, and proficiency. Qiu explored 'Aesthetic Form Analysis Ability in Visual Art Appreciation', finding that the ability of upper-grade primary students to analyze aesthetic forms was influenced by gender, socioeconomic status, and urban-rural disparities, with the environment having a significant impact on children's ability to appreciate beauty [36]. Chu used a modified questionnaire to assess the aesthetic literacy of fourth and sixth graders, finding that girls had a better orientation towards aesthetic literacy than boys, and that aesthetic literacy needs to be enhanced through education and training [37]. Lin found that in the central region, older primary girls had better aesthetic literacy than boys, and that enhancing the ability to explore aesthetics helps in assessing the current situation of aesthetic literacy among upper-grade primary students, also discovering overall improvements in students' aesthetic literacy.

The concept of aesthetic literacy has been constructed and modified through different research. In Taiwan, discussions on the aesthetic literacy of school teachers focus on educators from different learning stages. Study targeting either primary school teachers in Taitung County Community college teachers or examining primary school visual arts teachers [38-40].

Tian employed a questionnaire survey to explore the current status, differences, correlations, and predictive scenarios of aesthetic literacy among primary school teachers and their quality of work life [38]. The aesthetic literacy scale in this study included five dimensions: art knowledge, skills in expression and appreciation of visual arts, skills in expression and appreciation of music and performing arts, attitude towards art, and habits of participating in art, for the construction of the scale.

Tsai primarily used a questionnaire survey method to investigate feasible implementation methods of aesthetic education in community colleges [39]. The study further explored the status, differences, and correlations between community college teachers' teaching competencies, aesthetic literacy, and job satisfaction. The aesthetic literacy in this study included two dimensions: artistic literacy and humanities cultivation. Artistic cultivation encompassed participation in arts and attitudes towards art, while humanities cultivation included social concern and humanistic thinking.

Yu investigated the predictive effects of three variables among primary school visual arts teachers: professional ability, self-efficacy, and aesthetic literacy [40]. The aesthetic literacy questionnaire included three dimensions for judgment: feeling towards beauty, understanding of beauty, and experience of beauty. This may reflect ones' self-awareness.

Related factors influencing the formation of aesthetic literacy have become a focus of empirical research. These include the impact of different backgrounds, personal self-efficacy, professional abilities, or exposure to various media, among others.

Tian's research found that the aesthetic literacy and career quality of primary school teachers were generally above average, who typically possessed good aesthetic literacy and quality of work and life. The results showed that there was a positive correlation between aesthetic literacy and all five dimensions of worklife quality; that is, higher work quality was associated with higher aesthetic literacy. The correlation between teaching work and overall aesthetic literacy was found to be the highest.

Tsai's survey indicated that teaching competencies have a direct and positive as well as an indirect effect on job satisfaction through aesthetic literacy, and that aesthetic literacy is an important factor influencing job satisfaction [38]. Yu discovered that the current status of aesthetic literacy among primary school teachers tends to be good, and that for primary school visual arts teachers, both professional abilities and selfefficacy are positively correlated with their aesthetic literacy [40]. Higher professional abilities correlate with higher aesthetic literacy; similarly, higher self-efficacy correlates with higher aesthetic literacy. The aforementioned literature corroborates that there is a positive correlation between aesthetic literacy and worklife quality, teacher's professional ability, and self-efficacy.

These studies related to the aesthetic literacy of teachers, one study pointed out significant differences in aesthetic literacy among teachers of different ages [38]. Yu indicated significant differences in aesthetic literacy among teachers from different graduating departments [40]. The aesthetic literacy of primary school visual arts teachers who graduated from 'Visual Arts Education' and 'General Fine Arts-related departments' was higher than those from 'Education-related departments' and 'Others'.

Tsai found significant differences in teachers' aesthetic literacy based on gender, educational level, and further education status. Only Tian showed significant differences in aesthetic literacy based on years of teaching service, while both Tsai and Yu found no differences in aesthetic literacy based on teaching experience, as aesthetic literacy is related to personal experience and learning and is not easily changed by the duration of teaching [38-40].

Existing literature primarily explores the variables of career quality, job satisfaction in teaching, professional capability, and self-efficacy in relation to aesthetic literacy. These studies have identified influencing factors of aesthetic literacy. Yu's research also verified aesthetic literacy was differed with their gender and education background for primary school teachers of Taichung City [39]. However, there is low correlation between aesthetic literacy and teachers' professional developing needs for primary school teachers of Taichung City. Individuals' value or belief on career quality may be a factor to be explored further.

Previous research findings indicate that girls have better aesthetic literacy and creative attitudes than boys [36, 37, 41, 42]. Students' aesthetic experiences have a positive relationship with creativity, whether in creative thinking abilities (verbal and graphical) or creative attitudes. Accumulating aesthetic experiences can become potential energy for creativity [43]. The higher the students' aesthetic literacy, the higher their creative attitudes, as higher aesthetic literacy leads to a better perception of beauty. As aesthetic experiences are internalized, they accumulate creative potential, hence aiding in creative expression [44-45].

Media Use and Aesthetics
Research shows that the subcultures of adolescents display their attitudes towards life, values, and aesthetic attitudes [46]. Popular culture and diverse media usage among children and adolescents, such as video games, online games, idol stars, and anime, have a subtle influence on their aesthetics and ideologies [47]. The amount of teenagers' internet usage may affect their personality, values, and peer relationship [48].

Literature deal with aesthetics, animation, and games from different perspectives. Related to animation, the literature reveals that when interpreting cartoons, children less often focus on themes or colors, and more often describe plots and character behaviors. Children can appreciate the style, contrast, brightness, and tone of cartoon animations, and they prefer vibrant, bright, and rich colors. They often pay attention to the detailed changes in color, lighting, and background in cartoons. Children's thinking and appreciation logic for cartoons align with their cognitive ability, aesthetic judgment development, and life background [49]. Teenagers tend to rate realistic imagery styles higher in popularity. Aesthetic preferences in cartoon imagery are mostly concentrated in science fiction and fighting genres. Girls prefer themes of mythology and satirical absurdity, but in terms of aesthetics, in addition to mythology scoring highest, themes like romance, science fiction, action, and detective stories also score highly, indicating that girls can broadly appreciate the beauty across various themes [46, 50].

Regarding comic preferences and aesthetic literacy, primary school students of different genders have different preferences for comic book layouts and the beauty or ugliness of the drawings. Girls pay more attention to the visuals, and when the characters in the comics are drawn attractively, it attracts girls to read. The development of children's drawing and aesthetic experiences is greatly influenced by popular culture and is proportional to age. Most students learn to draw comic characters due to the influence of reading comics, and this is especially true for girls drawing 'dolls'. These images are their favorite subjects to draw and imitate [51, 52]. From the teacher's perspective, it's the same; Lin conducted a survey with art teachers, who believed that over 80% of their students' works were influenced by comics [53]. This matches the situation observed by researchers in teaching settings, where students often present comic-style character designs in their drawings.

Furthermore, regarding online games and aesthetic literacy, research has found that upper-grade primary students prefer Western realistic styles in online games [54]. Another study shows that middle school students are highly engaged with digital visual media (including internet images, games, animations, videos, etc.) and that this significantly and positively affects their aesthetic experiences [55]. This reflects that age growth seems to have a positive impact on aesthetic literacy. The interaction of online game may catch students' attention and participation.

Practice makes better. When students discuss different forms of art and media, they can develop a form of critical aesthetic literacy. Students can be inspired by other forms of art when creating their own artistic forms and media [56-58].

Research has found that students are already aware of aesthetic concepts, for example, in their daily use of social media platforms, purchasing fashion, or decorating their bedrooms. However, it also shows that students do not believe that aesthetics are taught in school, even though they think it could improve their performance in school [59].

The surge in social media platforms such as Instagram, Facebook, TikTok, and Snapchat indicates that we need this knowledge as well [60, 61]. For example, TikTok currently has over a billion users, whose goal is to create, share, and discover short videos shot on mobile phones (up to 15 seconds). Many of these videos are of people lip-syncing to songs and dancing. TikTok is also used to spread serious messages to others, such as those related to safety and health [62]. Aesthetic knowledge is needed when social media users set up accounts and continue to upload content [63].

The aesthetic characteristics in everyday work. For instance, D'Souza points out that "both amateur and professional creators can add effects such as filters, background music, and stickers to their videos, and they can collaborate on content and create split-screen duet videos even if they 'are located in different places'" [64]. This visual appeal is subjective, with many resonating only with certain users and not others. For example, cultural background may influence our types of taste [65]. However, there are some dimensions of common appeal that may attract most consumers [66]. How individuals to be raised in different family type seems to be a factor for analysis.

Different from the one-way reception of audio-visual message, social platforms provide a space for netizens to interact. Social networks provide diverse channels for members to discuss or evaluate any content, which may stimulate reflective thinking on the content (including aesthetics).

Based on the above empirical studies, this study proposes the following hypotheses: Hypothesis 1: Students' aesthetic literacy may be affected by different personal background variables. Hypothesis 2: Students' aesthetic literacy may be affected by their internet usage.

Research Design
This study employed face-to-face questionnaire surveys in 113 schools, consisting of 28 primary schools, 25 junior high schools, 29 high schools, and 31 universities in Taiwan. A total of 10,000 questionnaires were distributed among students, with 8,365 valid responses collected, yielding a response rate of 83.7%.

The personal socio-economic background variables of the respondents included: gender, age, learning stage (primary, junior high, high school, university), academic performance (excellent, above average, average, below average, poor), religious beliefs (Christianity, Catholicism, Buddhism, no faith, Islam, Taoism, I-Kuan Tao, folk beliefs (local worshipping), others), family type (three generations family, nuclear family, singleparent family, grandparenting, foster or boarding family, others), etc. Internet usage questionnaire is surveyed by using a smartphone or not, viewing time (weekends, weekdays), internet time (weekends, weekdays), exercise time (weekends, weekdays), years of internet use, social network participation, attending social networks events, web portal (school website, Google, HiNet, Yahoo! Kimo, Meta/Facebook, YouTube, PChome, MSN Taiwan, Yam Taro Vine, others), etc. The aesthetic literacy research scale was based on relevant theories and indicators related to aesthetic appreciation abilities from Taiwan's 9-year integrated curriculum (including arts and humanities, and important topics such as environmental education, home economics education) [67-70]. After exploring the content of aesthetic appreciation experiences, a basic framework for aesthetic appreciation experiences was developed, which served as a reference for the compilation of the "Preliminary Aesthetic Literacy Scale". The scale adopted a five-point Likert scale, with each question having five different levels of options (strongly agree, somewhat agree, don't know, somewhat disagree, strongly disagree), to measure the students' performance in aesthetic appreciation experiences. The scale was designed with a total of 20 questions.

The study used the Kaiser-Meyer-Olkin (KMO) sampling adequacy measure and Bartlett's test of sphericity to assess whether the items in the scale were suitable for factor analysis. A larger KMO value (closer to 1) indicates more common factors among the questions, and lower net correlation coefficients among the variables, making it more suitable for factor analysis. According to Kaiser, a KMO value of .70 is acceptable for factor analysis. The KMO value for "Aesthetic Literacy" was .958, indicating that the variables have common factors and are suitable for factor analysis. Factor analysis identified two factors: Aesthetic Presentation and Reflective representation. The reliability for the Aesthetic Presentation factor was .942, and for the Reflective representation factor, it was .92.

Table 1: Factor Analysis of Aesthetic Literacy

Questionnaire Variables	Factor Loading Values	Eigenvalues	Explained Variance (%)	Reliability (Cronbach's Alpha)
Aesthetic Presentation Dimension		6.537	32.687	.942
I collect art and cultural information from different cultures.	.791			
I can explain the artistic creation characteristics of my own culture to others.	.776			
I can specifically describe the differences in artistic creation across different cultures.	.772			
I collect art and cultural information about my own culture.	.770			
I actively search for information related to art and cultural activities on a regular basis.	.759			
I use my free time to participate in various types of art and cultural activities.	.743			
I can clearly understand the meanings of art works.	.699			
I pay attention to the ongoing art and cultural activities.	.682			
I like to recommend good art and cultural activities or exhibition information to friends.	.677			
I can distinguish the characteristics of artistic creations from different cultures.	.617			
Reflective representation Dimension		5.925	29.624	.920
When dining out, I value the decoration and layout of the restaurant.	.745			
I feel happy and joyful when I discover unexpected beautiful scenery.	.741			
I like to decorate my home, room, and study.	.725			
I dine in restaurants with a beautiful atmosphere.	.705			
I notice beautiful scenery in my daily life.	.701			
I appreciate the patterns of life in nature.	.674			
I like to capture everyday emotions through photography, recording, etc.	.656			
Product design is an important consideration for me when making purchases.	.653			

I have a clear understanding of my preferences and style in clothing.	.627			
I use social networking sites to share everyday beautiful scenery with others.	.594			
Total Cumulative Explained Variance (%)			62.310	

Research Findings
Personal Background
This study conducted face-to-face questionnaire surveys with students from upper primary school grades to the fourth year of university were slightly more numerous (51.2%), while females accounted for 48.8%. In terms of educational stages, university students were the majority (41.2%), followed by junior high (23.3%), high school (21%), and then primary school students (14.4%).

Table 2: Distribution of Gender and Educational Stage

GENDER	Frequency	Percentage
MALE	4279	51.2
FEMALE	4086	48.8
TOTAL	8365	100.0
GRADE	**Frequency**	**Percentage**
PRIMARY	1205	14.4
JUNIOR HIGH	1952	23.3
HIGH SCHOL.	1758	21.0
UNIVERSITY	3450	41.2
TOTAL	8365	100.0

The family types of children and adolescents include three generations living together, two generations living together, single-parent, grandparenting, foster or boarding, and others. The most common is two generations living together (60.3%), followed by three generations living together (24.6%), and single-parent families (11.9%). For the religious beliefs in the families of children and adolescents, folk religion is the most common (34.2%), followed by no religious belief (30.4%), then Daoism (14.9%), Buddhism (8.8%), and Christianity (7.6%).

Table 3: Family Type and Religious Beliefs

Family type	Frequency	Percentage
Three generations family	2058	24.6
Two generations family	5045	60.3
Single-parent family	997	11.9
Grandparenting family	155	1.8
Foster or boarding family	37	0.4
Others	73	0.9
Total	**8364**	**100.0**
Religion	**Frequency**	**Percentage**
Christianity	634	7.6
Catholicism	86	1.0
Buddhism	736	8.8
No religious belief	2541	30.4
Islam	17	0.2
Taoism	1248	14.9
I-Kuan Tao	96	1.1
Folk religion (worshipping)	2861	34.2
Others	144	1.7
Total	8363	100.0

Online Usage
Over 80% of children and adolescents from upper primary school grades to the fourth year of university own a mobile phone (92.5%). Up to over 98% are smartphones, indicating that smartphones are closely integrated into the lives of children and adolescents during the pandemic.

Table 4: Mobile Phone Ownership among Children and Adolescents

	Frequency	Percentage		Percentage
Use mobile phone	7740	92.5	Smartphone	98.3
No mobile phone	625	7.5	Basic Mobile Phone	1.7
Total	8365	100.0		100.0

Overall, students from upper primary school grades to the fourth year of university spend 37.56 hours per week using mobile phones, 38.56 hours per week online, 12.08 hours per week watching TV, and only 9.66 hours per week exercising.

Among them, the daily average time spent using mobile phones and being online is the highest on weekdays, with 4.84 hours each. This is followed by watching TV (M=1.34 hours); the daily exercise time on weekdays is 1.3 hours.

The daily average computer use time is the highest on weekends and holidays, reaching 7.18 hours. This is followed by using mobile phones (M=6.68 hours), then watching TV (M=2.69 hours). The daily exercise time on weekends and holidays is 1.58 hours.

Table 5: Media Use and Exercise among Children and Adolescents

	Average Hours on Weekdays	Average Hours on Weekends
TV Viewing	1.34	2.69
Computer	4.84	7.18
Mobile/Tablet	4.84	6.68
Taking Exercise	1.3	1.58

The most commonly used portal websites by children and adolescents are Google (42.4%), followed by the social media and video platform YouTube (38.1%). The remainder includes other websites (8.9%), Facebook (7.8%). All other websites used as portals account for less than 10% each.

Table 6: Commonly Used Portal Websites Among Children and Adolescents

Portal Website	Frequency	Percentage
School Website	153	1.9
Yahoo!	36	0.4
Google	3497	42.4
HiNet	5	0.1
Facebook	646	7.8
PChome	22	0.3
MSN Taiwan(Bing)	13	0.2
Yam Taro Vine	1	0.0
YouTube	3139	38.1
Others	730	8.9
Total	8243	100.0

Table 7: Participation of Children and Adolescents in Online Communities

Community Participation	Frequency	%
Yes	5444	65.1
No	2275	27.2
Don't Know	646	7.7
Total	8365	100.0
Attend online gatherings	frequency	%
Frequently attend	199	3.7
Occasionally attend	569	10.5
Rarely attend	912	16.8
Never attended	3292	60.5
Don't Know	472	8.7
Total	5444	100.0

Participation in Online Communities

Over 65% of children and adolescents participate in online communities. This phenomenon showed continuous growth from 2010-2017, then plateaued, and has risen slightly in the past year.

In 2010, 1,090 students from grade 5 of primary school to university freshman across Taiwan participated in online communities (1.6%). In 2011, nearly 20% of children and adolescents indicated that they participated in online communities (19.6%). In 2012, over 20% of children and adolescents said they participated in online communities (24%). This figure grew to 43% in 2013. In 2014, among students from grade 5 of primary school to grade 3 of high school across Taiwan, nearly 60% participated in online communities (7,721 people, 58.7%). In 2016, nearly 60% of students from grade 5 of primary school to university freshman participated in online communities. In 2017, with the addition of grade 2 and 3 college students, the participation rate exceeded 70%. Last year it was 64%, and this year it is 65%.

Due to the pandemic's impact, students' daily routines have become more closely integrated with online communities. Online community members consist primarily of friends, exceeding the circle of classmates in daily life. Affected by the stay-at-home policy, over 76% of student children and adolescents rarely or never attend online gatherings, while less than 15% occasionally or frequently attend them.

Aesthetic Literacy of Children and Adolescents

The survey subjects included students from upper primary school grades to the senior of university. Through factor analysis and with reference to Dufrenne's theory of aesthetic experience, Feldman's theory of aesthetic appreciation as well as Yan's study (2013), the aesthetic literacy of Taiwanese children and adolescents can be divided into two dimensions: aesthetic presentation and reflective representation [67, 68]. The average score of aesthetic literacy for the student respondents was 3.77 points. The aesthetic presentation score (M=3.94) was higher than the reflective representation dimension (M=3.59).

Table 8: Aesthetic Literacy of Children and Adolescents

Item	Strongly agree	Agree	Strongly disagree	Disagree	Don't Know	Mean
Aesthetic Literacy						3.77
Aesthetic Presentation						3.94
6 Product design is one of the important factors I consider when purchasing goods	6.8	1.9	7.6	49.9	33.8	4.02
7 I can clearly understand my preferences and style for clothing	8.4	2.2	9.7	45.2	34.5	3.95
8 When dining out, I pay attention to the restaurant's interior design and tableware arrangements	7.7	2.3	12.7	48.6	28.6	3.88
9 I like to decorate my own home, room, and study, etc.	6.5	2.0	10.8	44.0	36.6	4.02
10 I dine at restaurants with a beautiful atmosphere	9.4	2.4	12.3	47.7	28.2	3.83
11 I notice beautiful sights around me in daily life, such as roadside flowers, clouds in the sky, etc.	7.7	2.4	9.5	45.2	35.3	3.98
12 I like to use photography, audio/video recording and other methods to capture touching everyday life scenes	8.3	4.2	17.6	39.5	30.4	3.80
13 I feel happy and delighted when I discover unexpected beautiful scenery	6.3	1.6	6.2	43.0	42.9	4.15

14 I can appreciate the life patterns of organisms in nature, such as the thickness of clouds, the colors of leaves, etc.	6.8	2.1	8.6	45.2	37.3	4.04
15 I share the beautiful everyday life scenes I capture with others on social media	7.7	5.8	17.6	39.2	29.6	3.77
Reflective representation						3.59
1 I pay attention to the current art and cultural activities that are taking place	9.1	2.7	14.1	44.7	29.4	3.83
2 When appreciating works of art, I can clearly understand the meaning of the works, such as the creative concepts, content, and logicality of the expressive forms	11.4	2.6	13.6	47.2	25.3	3.72
3 I like to recommend good arts and cultural activities or exhibition information to my friends	9.6	4.4	19.0	41.5	25.4	3.69
4 In my daily life, I take initiative to search for information about arts and cultural activities	9.7	8.0	31.7	32.8	17.8	3.41
5 I use my spare time to participate in different types of arts and cultural activities such as painting exhibitions, photography exhibitions, sculpture exhibitions, or performing arts activities like musicals and dramas	9.5	7.7	26.8	36.6	19.4	3.49
16 I can distinguish between the characteristics of artistic creations from different cultures, such as the differences between indigenous and Hakka cultures	10.8	3.0	14.1	46.5	25.6	3.73
17 I collect information about the arts and culture of my own culture	11.5	4.2	22.9	39.8	21.7	3.56
18 I collect information about the arts and cultures of different cultures	11.3	4.6	22.7	40.4	21.1	3.55
19 I can explain to others the distinctive characteristics of the artistic creations in my own culture	13.9	4.8	22.9	38.4	20.0	3.46
20 I can clearly explain the differences in artistic creations presented across cultures	15.1	4.8	22.0	38.8	19.4	3.43

Further examining the aesthetic presentation dimension, children and adolescents' aesthetic literacy scores were highest for "I feel happy and delighted when I discover unexpected beautiful scenery" (M=4.15), followed by "I can appreciate the life patterns of organisms in nature, such as the thickness of clouds, the colors of leaves, etc." (M=4.04). For purchasing goods, "product design is one of the important factors I consider" (M=4.02) and "I like to decorate my own home, room, and study, etc." (M=4.02). This means that children and adolescents already have considerable awareness of the aesthetics of life and their environment.

For the reflective representation dimension of aesthetic literacy, scores higher than average include: "I pay attention to the current art and cultural activities that are taking place" (M=3.83), "I can distinguish between the characteristics of artistic creations from different cultures, such as the differences between indigenous and Hakka cultures" (M=3.73), and "When appreciating works of art, I can clearly understand the meaning of the works, such as the creative concepts, content, and logicality of the expressive forms" (M=3.72). Children and adolescents show good performance in observing or appreciating artistic works and identifying creations from different cultures. This implies that Taiwan's multicultural and arts education in recent years already has considerable positive impact.

The most deficient areas in the reflective representation dimension include: "I take initiative to search for information about arts and cultural activities in my daily life" (M=3.41), "I can clearly explain the differences in artistic creations presented across cultures" (M=3.43), "I can explain to others the distinctive characteristics of the artistic creations in my own culture" (M=3.46), and "I use my spare time to participate in different types of arts and cultural activities such as painting exhibitions, photography exhibitions, sculpture exhibitions, or performing arts activities like musicals and dramas" (M=3.49).

Undeniably, physical arts and cultural activities were suspended during the pandemic, affecting opportunities for respondents to have actual contact. However, students' behavior of searching for related information about arts and culture online is also quite limited. Let alone explaining the characteristics of their own cultural art to others – does this reflect the inadequacy of domestic cultural arts education or teaching materials? Does it show that promotion and marketing of local arts and culture requires strengthening?

Hypothesis Testing
Analysis of t-tests shows that for students from upper primary school grades to the fourth year of university, differences in gender lead to significant differences in overall aesthetic literacy, aesthetic presentation dimension of aesthetic literacy, and reflective representation dimension of aesthetic literacy (t=7.189, p<.001***; t=-2.385, p<.05*; t=-11.856, p<.001***). Female students' scores

in overall aesthetic literacy, aesthetic presentation dimension, and reflective representation dimension were markedly higher than those of male students. These differences may be influenced by socially and culturally ingrained gender role divisions, or by female students being especially encouraged throughout their upbringing to keep tidy and look beautiful.

Table 9: T-Test of Gender and Aesthetic Literacy

Category	Option	Count	Mean	t-value	p-value
Aesthetic literacy	Male	3942	3.66	-7.189	.000***
	Female	4423	3.80		
Aesthetic presentation	Male	3942	3.54	-2.385	.017*
	Female	4423	3.59		
Reflective representation	Male	3942	3.78	-11.856	.000***
	Female	4423	4.01		

*p <.05, **p <.01, ***p <.001

Through ANOVA analysis, students at different learning stages - university, primary school, middle school, and high school - show very significant differences in aesthetic literacy in sequence. Looking at overall aesthetic literacy and the aesthetic presentation dimension (F=18.593, p<.001***; F=21.151, p<.001***), university students had the highest scores, followed by primary school students and middle school students, with high school students slightly lower. For the reflective representation dimension, university students had the highest scores, followed by high school students, middle school students, and primary school students (F=25.964, p<.001***). Compared to middle school students in Taiwan, university students and primary school students face more limited academic pressure, which corresponds with their higher aesthetic literacy scores overall and in the aesthetic presentation dimension. However, university students and high school students show higher aesthetic literacy in critical thinking towards aesthetics compared to primary students in the reflective representation dimension.

Table 10: ANOVA Analysis of Learning Stage and Aesthetic Literacy

		Primary	Junior High	High School	University	Total
Aesthetic literacy	Freq.	2109	2937	2070	1249	8365
	Mean	3.75	3.72	3.65	3.89	3.74
	S.D	.983	.990	.829	.641	.908
	F=18.593 Sig. .000***					
Aesthetic presentation	Freq.	2109	2937	2070	1249	8365
	Mean	3.64	3.56	3.43	3.68	3.57
	S.D.	1.102	1.088	.946	.776	1.020
	F=21.151 Sig. .000***					
Reflective representation	Freq.	2109	2937	2070	1249	8365
	Mean	3.85	3.87	3.88	4.11	3.90
	S.D.	.967	.987	.825	.623	.901
	F=25.964 Sig. .000***					

*p<.05, **p<.01, ***p<.001

The ANOVA analysis revealed that students with different religious beliefs and family backgrounds have significantly different levels of aesthetic sensibility (F=6.086, p<.001***; F=7.743, p<.001***). When observing aesthetic literacy and its presentation, college students scored the highest, followed by primary school students, junior high school students, and high school students, with slightly lower scores (F=25.964, p<.001***). Compared to Taiwanese high school students, college students and primary school students experience less academic pressure, which is reflected in their aesthetic literacy and its presentation. However, in terms of critical thinking about beauty, college students and high school students score higher than primary school students in the reflective dimension of aesthetic sensibility.

Table 11: ANOVA Analysis of Religious Beliefs and Aesthetic Literacy

		Christianity	Catholic	Buddhism	No	Islam	Taoism	I-Kuan Tao	Folk	Others	Total
Aesthetic literacy	Freq.	631	93	688	2274	19	1348	91	3057	162	8363
	Mean	3.74	3.79	3.88	3.68	3.38	3.79	3.65	3.73	3.47	3.73
	S.D.	.928	.957	.850	.930	1.719	.944	.957	.843	1.249	.908
	F=6.086 Sig. .000***										
Aesthetic presentation	Freq.	631	93	688	2274	19	1348	91	3057	162	8363
	Mean	3.59	3.69	3.73	3.51	3.38	3.63	3.54	3.55	3.35	3.57
	S.D.	1.037	1.043	.981	1.037	1.750	1.0524	1.0327	.968	1.314	1.020
	F=5.019 Sig. .000***										
Reflective representation	Freq.	631	93	688	2274	19	1348	91	3057	162	8363
	Mean	3.89	3.89	4.04	3.86	3.38	3.96	3.76	3.91	3.60	3.90
	S.D.	.928	.960	.816	.926	1.702	.939	.963	.832	1.267	.901
	F=6.659 Sig. .000***										

*p <.05, **p <.01, ***p <.001

According to the results of ANOVA, it was found that students from different family backgrounds have significantly different levels of aesthetic sensibility. Regardless of aesthetic literacy, aesthetic presentation, or aesthetic reflection dimensions (F=7.743, p<.001***; F=5.255, p<.001***; F=9.163, p<.001***), those growing up in multi-generational households scored the highest, followed by three-generational households, single-parent families, or students raised by grandparents, while students from foster or boarding families scored lower.

The difference in parental roles and communication levels in multi-generational households, as opposed to the more diverse family responsibilities in three-generational households, may contribute to these variations in aesthetic sensibility development. Additionally, whether the Count of family members at home affects children's development of aesthetic sensibility remains to be confirmed in further research.

Pearson correlation analysis indicates that the age and academic performance of students from third grade to twelfth grade are positively and negatively correlated with aesthetic sensibility, respectively. Older students exhibit better aesthetic literacy and aesthetic sensibility in the reflective dimension (r=.038, p<.01**; r=.082, p<.01**). The academic performance of students is positively correlated with aesthetic literacy, aesthetic presentation, and aesthetic sensibility in the reflective dimension (r=.104, p<.01**; r=.082, p<.01**; r=.111, p<.01**).

Table 12: ANOVA Analysis of Family Types and Aesthetic Literacy

		Three generations	Two generations	Single parent	Grandparenting	Foster/ boarding	Others	Total
Aaesthetic literacy	Freq.	2295	4793	988	184	40	64	8364
	Mean	3.73	3.76	3.71	3.70	3.50	3.09	3.74
	S.D.	.907	.876	.984	.968	1.242	1.291	.907
	F=7.743 Sig. .000***							
Aesthetic presentation	Freq.	2295	4793	988	184	40	64	8364
	Mean	3.56	3.59	3.54	3.55	3.41	2.96	3.56
	S.D.	1.025	.993	1.086	1.051	1.284	1.307	1.020
	F=5.255 Sig. .000***							
Reflective representation	Freq.	2295	4793	988	184	40	64	8364
	Mean	3.89	3.93	3.88	3.86	3.61	3.22	3.90
	S.D.	.894	.867	.978	.980	1.272	1.340	.900
	F=9.163 Sig. .000***							

*p<.05, **p<.01, ***p<.001

The better aesthetic sensibility exhibited by older students corresponds to students in the university stage, where aesthetic sensibility scores are higher compared to other stages of learning. This may be related to the maturity of university students or their learning experiences. Additionally, Taiwanese students with better academic performance tend to possess relatively higher levels of aesthetic

sensibility. Students with outstanding academic achievements have higher aesthetic sensibility compared to those with average grades. This suggests that students with higher learning efficiency experience an improvement in self-esteem and selfimage, which may also be reflected in aesthetic perception and reflection.

Pearson correlation analysis confirms that the more time students spend on weekend or weekday exercise, the higher their aesthetic literacy (r=.092, p<.01**; r=.052, p<.01**), aesthetic presentation (r=.113, p<.01**; r=.067, p<.01**), and aesthetic sensibility in the reflective dimension (r=.057, p<.01**; r=.029, p<.01**). This reflects that leisure and exercise provide students with life experiences and thinking space that contribute to the inspiration and cultivation of aesthetic literacy, aesthetic presentation, and aesthetic sensibility in the reflective dimension.

Table 13: Pearson Correlation Analysis of Online Experience, Age, Academic Performance and Aesthetic Literacy

	Age	Academic Performance	Weekend Exercise	Weekday Exercise
Aesthetic literacy	.038**	.104**	.092**	.052**
Aesthetic presentation	-.005	.087**	.113**	.067**
Reflective representation	.082**	.111**	.057**	.029**

*p <.05, **pe<.01, ***p <.001

Based on the above findings, Hypothesis 1 being validated are listed:
H-1.1: Students of different genders performs differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.2: Students of different learning stage performs differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.3: Students with different religious beliefs performs differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.4: Students from different family types performs differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.5: The age of students is positively correlated with their aesthetic literacy and reflective aesthetic. H-1.6: The academic performance of students is positively correlated with their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.7: The exercise time of students is positively correlated with their aesthetic literacy, aesthetic presentation, and reflective aesthetic.

Whether or not the degree of students' aesthetic literacy will be affected by their online behavior, smartphone usage, social network participation, web portals usage, viewing time, and online experience is examined as the followings.

According to the t-test, students from upper primary school grades to the fourth year of university who use smartphones have differences in reflective aesthetic (t=2.366, p<.05*). Students who use smartphones perform higher scores in reflective aesthetic. Students who join online communities perform higher scores in aesthetic literacy and reflective aesthetic compared to those who do not (t=2.271, p<.05*; t=4.162, p<.001***). Smartphones provide better audiovisual quality and communication capabilities, and members of online communities have space for interaction and discussion, which is beneficial for reflective thinking.

Table 14: T-Test for Smartphone Use, Social Media Participation, and Aesthetic Literacy

Category	Smartphone Usage	Freq.	Mean	t-value	Sig.	Social Networks Participation	Freq.	Mean	t-value	Sig.
Aesthetic literacy	Yes	7170	3.7426				5063	3.7823	2.271	.023*
	No	211	3.6784				2551	3.7329		
Aesthetic presentation	Yes	7170	3.5626				5063	3.6026	.390	.696
	No	211	3.6028				2551	3.5930		
Reflective representation	Yes	7170	3.9225				5063	3.9619	4.162	.000***
	No	211	3.7540				2551	3.8727		

*p <.05, ** p <.01, *** p <.001

ANOVA analysis found that students from upper primary school grades to the fourth year of university who use different web portals exhibit significant differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic (F=2.7, p<.01**; F=2.913, p<.01**; F=3.392, p<.001***). When observing aesthetic literacy, users of Yam, Meta/Facebook, Google, school websites, MSN, YouTube, and other web portals have significantly higher average values of aesthetic literacy compared to users of Hinet, Yahoo!, and PChome.

Table 15: ANOVA Analysis of Web Portals and Aesthetic Literacy

		School Web	Yahoo	Google	HiNet	Meta	PChome	MSN TW	Yam	YT	Others	Total
Aesthetic literacy	Freq.	136	49	2746	4	836	21	17	2	3439	924	8174
	Mean	3.76	3.54	3.78	2.69	3.80	3.62	3.74	4.17	3.70	3.72	3.74
	S.D.	1.098	1.198	.827	1.152	.917	.918	1.342	.035	.909	.975	.899
	F=2.700 ; Sig. .004**											
Aesthetic presentation	Freq.	136	49	2746	4	836	21	17	2	3439	924	8174
	Mean	3.68	3.50	3.61	2.50	3.66	3.44	3.68	3.95	3.53	3.48	3.56
	S.D.	1.160	1.217	.946	1.080	1.032	.956	1.368	.070	1.025	1.088	1.013
	F=2.913 ; Sig. .002**											
Reflective representation	Freq.	136	49	2746	4	836	21	17	2	3439	924	8174
	Mean	3.84	3.57	3.95	2.87	3.94	3.81	3.81	4.40	3.86	3.94	3.90
	S.D.	1.112	1.212	.813	1.268	.907	1.079	1.362	.000	.900	.977	.891
	F=3.392 ; Sig. . 000***											

*p <.05, ** p <.01, *** p <.001

In terms of aesthetic presentation dimension, the average scores of aesthetic presentation for users of Yam, school websites, MSN, and Meta/Facebook are significantly higher than those for users of Google, YouTube, Yahoo!, Hinet, PChome, and other web portals.

In the dimension of reflective aesthetic, users of Yam, Google, Meta/Facebook, and other web portals reply significantly higher average scores than users of YouTube and school websites. Additionally, users of MSN, PChome, Yahoo!, and Hinet perform lower average scores.

Pearson correlation analysis found a negative correlation between the time spent on audiovisual media by students and their aesthetic literacy and aesthetic presentation. Longer weekend or weekday average viewing hours were associated with lower scores in aesthetic literacy ($r=-.043$, $p<.01**$; $r=-.054$, $p<.01**$) and aesthetic presentation ($r=-.03$, $p<.05*$; $r=-.028$, $p<.05**$). Longer weekend or weekday average online hours were associated with lower scores in aesthetic literacy ($r=-.073$, $p<.01**$; $r=-.025$, $p<.01**$) and aesthetic presentation ($r=-.087$, $p<.05*$; $r=-.035$, $p<.05**$). Longer weekend or weekday average viewing hours were associated with lower scores in reflective aesthetic ($r=-.053$, $p<.01**$; $r=-.077$, $p<.01**$) and aesthetic presentation ($r=-.03$, $p<.05*$; $r=-.028$, $p<.05**$). Longer weekend average online hours were associated with lower scores in aesthetic literacy ($r=-.049$, $p<.01**$).

On the other hand, students from upper primary school grades to the fourth year of university with longer online experience had higher scores in reflective aesthetic. Longer weekend or weekday average viewing hours were negatively associated with the degree of aesthetic literacy ($r=-.043$, $p<.01**$; $r=-.054$, $p<.01**$) and aesthetic presentation ($r=-.03$, $p<.05*$; $r=-.028$, $p<.05**$). Longer weekend or weekday average online hours were negatively associated in aesthetic literacy ($r=-.073$, $p<.01**$; $r=-.025$, $p<.01**$) but positively associated in aesthetic presentation ($r=.034$, $p<.01**$).

The results suggest that audiovisual media consumption does not contribute significantly to the development of aesthetic literacy among students. This may be due to students' passive usage or exposure to content driven by big data, which lacks subjective selection or critical thinking. As students gain more online experience, their ability to compare or evaluate aesthetics may increase due to familiarity with the tool, as well as changes in age and life experiences.

Table 16: Pearson Correlation Analysis of Viewing Time, Online Time, Online Experience and Aesthetic Literacy

	Weekend/Holiday Viewing Hours	Weekday Viewing Hours	Weekend/Holiday Online Hours	Weekday Online Hours	Online experience
Aesthetic literacy	-.043**	-.054**	-.073**	-.025*	.017
Aesthetic presentation	-.030*	-.028*	-.087**	-.035**	.001
Reflective representation	-.053**	-.077**	-.049**	-.010	.034**

*p <.05, ** p <.01, *** p <.001

Research Hypothesis 2 has been validated as listing:
H-2.1: Students who use smartphones or not perform significant differences in reflective aesthetic literacy.
H-2.2: Students who participate in social networks or not perform differences in aesthetic literacy and reflective aesthetic literacy.
H-2.3: Students who use different web portals exhibit significant differences in aesthetic literacy, aesthetic presentation, and reflective aesthetic literacy.

H-2.4: The time students spend on audiovisual media is negatively correlated with their aesthetic literacy and aesthetic presentation literacy.
H-2.5: The longer students' online experience, the better their reflective aesthetic literacy.

Step-Wise Regression Analysis
Further, stepwise regression is used to analyze the aesthetic literacy, and the following regression equation is obtained: Aesthetic Literacy = .084 academic performance + .125 social network participation + .051 weekend/ holiday exercise hours + .169 gender - .019 weekends/holidays online hours + .018 weekday online hours + 3.891.

In addition to the negative predictive power of weekends/holidays online hours, academic performance, social network participation, weekend/ holiday exercise hours, female gender and weekdays online hours have positive predictive power on the aesthetic literacy in order.

Table 17: Step-wise Regression on Aesthetic Literacy and Predicted Factors

Aesthetic Literacy	Unstandardized coefficients	Standardized coefficients	T	Significance	Model
(Constant)	3.891	.062		62.343	.000
Academic performance	.084	.011	-.104	-7.538	.000
Social network participation	.125	.019	-.093	-6.750	.000
Weekends/ holidays exercise hours	.051	.007	.100	7.129	.000
Gender	.169	.024	.097	6.906	.000
Weekends/ holidays online hours	-.019	.004	-.103	-5.372	.000
Weekday online hours	.018	.004	.079	4.079	.000

Using stepwise regression to analyze the aesthetic presentation dimension of aesthetic literacy, the following regression equation can be found as follows: Aesthetic presentation dimension of aesthetic literacy = .065 weekends/holidays exercise hours + .079 academic performance + .123 social network participation - .026 weekends/holidays online hours + .021 weekdays online hours + .091 gender+ 3.822.

Except the negative predictive power of weekends/holidays online hours, weekends/holidays exercise hours, academic performance, social netowrk participation, weekdays online hours and female gender show the positive predictive power on aesthetic presentation dimension of aesthetic literacy orderly.

Table 18: Step-wise Regression on Aesthetic Presentation and Predicted Factors

Aesthetic Presentation Dimension	Unstandardized coefficients	Standardized coefficients	T	Significance	Model
(Constant)	3.822	.071		53.782	.000
Weekends/holidays exercise hours	.065	.008	.112	7.983	.000
Academic performances	.079	.013	-.086	-6.231	.000
Social network participation	.123	.021	-.081	-5.805	.000
Weekends/holidays online hours	-.026	.004	-.121	-6.245	.000
Weekday online hours	.021	.005	.082	4.247	.000
Gender	.091	.028	.046	3.282	.001

Step-wise regression analysis is conducted to examine the reflective presentation dimension of aesthetic literacy, we can obtain the following regression equation: Reflective representation dimension of aesthetic literacy = .237 gender + .084 academic performance - .119 social network participation - .042 weekends/holidays exercise hours + .016 Age - .011 weekends/holidays online hours - .018 weekdays viewing hours +.011 weekdays online hours +3.74.

Table 19: Step-wise Regression on Reflective Presentation and Predicted Factors

Reflective Aesthetic Dimension	Unstandardized coefficients	Standardized coefficients	T	Significance	Model
(Constant)	3.740	.087		42.789	.000
Gender	.237	.024	.138	9.843	.000
Academic performance	.084	.011	-.106	-7.690	.000
Social network participation	.119	.018	-.090	-6.493	.000
Weekends/holidays exercise hours	.042	.007	.084	5.939	.000
Age	.016	.004	.056	3.670	.000
Weekends/holidays online hours	-.011	.004	-.062	-3.199	.001
Weekday viewing hours	-.018	.007	-.038	-2.597	.009
Weekday online hours	.011	.005	.047	2.254	.024

Besides the negative predictive power of weekends/holidays online hours and weekends/holidays viewing hours, gender, academic performance, social network participation, weekends/ holidays exercise hours, age, weekdays online hours have positive predictive power on the reflective representation of aesthetic literacy.

Conclusion and Discussion
Understanding aesthetics as a state of mind involves the idea of aesthetic experience (Iseminger, 2003). During COVID-19, internet becomes the most powerful channel for learning, entertaining, shopping, or any social connection. Given their intensive online schedules, this paper explores how young students gaining aesthetic experiences through digital platforms.

Based on the analysis of face-to-face questionnaire surveys with 8365 students from 113 schools from the primary school to university in Taiwan, the results are summarized as the followings.

What Are the Online Usage and Aesthetic Literacy of Young Students in Taiwan?
Young students from upper primary school grades to the fourth year of university spend 37.56 hours per week using mobile phones, 38.56 hours per week online, 12.08 hours per week watching TV, and only 9.66 hours per week exercising.

The most commonly used portal websites by children and adolescents are Google (42.4%), followed by the social media and video platform YouTube (38.1%). The remainder includes other websites (8.9%), Facebook (7.8%). All other websites used as portals account for less than 10% each. With the prevalence of artificial intelligence, young students' internet usage tends to be passively received information. This brings out the situation of echo chamber (Gao, Y., Liu, F. & Gao, L.,2023), users may be immersed in similar or narrow information and peer groups. Over 65% of children and adolescents participate in online communities. This phenomenon showed continuous growth from 2010-2017, then plateaued, and has risen slightly in the past year.

Less than 30% would attend social network events which means young students rely on internet usage indoor, even interact with members of social networks at home.

On the other hand, the aesthetic literacy of Taiwanese children and adolescents can be divided into two dimensions: aesthetic presentation and reflective representation. The average score of aesthetic literacy for the student respondents was 3.77 points. The aesthetic presentation score (M=3.94) was higher than the reflective representation dimension (M=3.59).

Although young students tend to agree the statement "I feel happy and delighted when I discover unexpected beautiful scenery" (M=4.15) or "Product design is one of the important factors I consider when purchasing goods" (M=4.02), but performs lower interest in the statement "In my daily life, I take initiative to search for information about arts and cultural activities" (M=3.41) or "I can clearly explain the differences in artistic creations presented across cultures" (M=3.43).

It seems that young students can experience the beautiful existing objects in living circumstance or online rather than dig into details or further thinking. Young students may receive a lot of information thought online during COVID-19, which tends to be passively used or ritual use [71].

Is There any Relationship between Online usage and Aesthetic literacy of Young Students in Taiwan?
According to data analysis with t-test, ANOVA, personal correlation, as well as stepwise regression analysis, there is different relationship with the degree of aesthetic literacy of young students. Several propositions are proposed as listing.

Personal Background and Aesthetic Literacy
H-1.1: Students of different genders performs differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.2: Students of different learning stage performs differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.3: Students with different religious beliefs performs differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.4: Students from different family types performs differences in their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.5: The age of students is positively correlated with their aesthetic literacy and reflective aesthetic. H-1.6: The academic performance of students is positively correlated with their aesthetic literacy, aesthetic presentation, and reflective aesthetic.
H-1.7: The exercise time of students is positively correlated with their aesthetic literacy, aesthetic presentation, and reflective aesthetic.

Online usage and Aesthetic Literacy
H-2.1: Students who use smartphones or not perform significant differences in reflective aesthetic literacy.
H-2.2: Students who participate in social networks or not perform

differences in aesthetic literacy and reflective aesthetic literacy.

H-2.3: Students who use different web portals exhibit significant differences in aesthetic literacy, aesthetic presentation, and reflective aesthetic literacy.

H-2.4: The time students spend on audiovisual media is negatively correlated with their aesthetic literacy and aesthetic presentation literacy.

H-2.5: The longer students' online experience, the better their reflective aesthetic literacy.

Results of the step-wise regression analysis show the predictors of aesthetic literacy include: In addition to the negative predictive power of weekend/holiday online hours, factors regarding daily exercise time on weekends and holidays, academic performance, social network participation, weekday online hours, gender all show the positive predictive power of aesthetic presentation literacy in order. Except the negative predictive power of the weekend/holiday online hours and the weekend/holiday viewing hours, factors on gender, academic performance, social network participation, daily exercise hours, age, weekdays online hours execute positive predictive power on the reflective presentation literacy orderly.

According to the literature, individuals with high levels of interpersonal mindfulness preserve awareness during interpersonal connections and perceive their senses, feelings, thoughts and experiences during the interactions with others [72]. The study show that young generation's aesthetic literacy starts from self-awareness and observation on living experiences as well as social connections. The development of aesthetic literacy takes time to get along with oneself in the real society rather than being heavily immersed in the virtual world of internet [73-84].

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