IOSR Journal Of Humanities And Social Science (IOSR-JHSS)
Volume 30, Issue 4, Series 1 (April, 2025) 39-67
e-ISSN: 2279-0837, p-ISSN: 2279-0845.
www.iosrjournals.org

Structural Adjustment And Educational Reform: Youth Aspirations Towards The Future

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Paper Abstract
Exploring landscapes of education in local is a daunting task. The local communities have set out to research educational policies in their embeddedness in local economies, labour markets and individual life projects of young adults. The author analyses how a variety of local institutional, economic, and opportunity structures influences the educational policies targeting youth education and labour market trajectories. Our analyses provide answers to the following three research questions: First, to what extent are the objectives of educational policies influenced by the national skills formation regimes? Second, to what extent are the objectives of educational policies based on the local demand for skills? Third, to what extent are the orientations of educational policies influencing youth educational and employment trajectories? The paper discusses the educational reform in the age of globalization, with reference to structural adjustment and educational reform, global pedagogies, changing paradigms, SDGs & ESD, employability and human capital, technology-enhanced learning, and the artificial intelligence in education. Studying the complex relationships between educational policymaking and young adults' life courses, requires a careful research approach. The multimethod design was used to bring together the results from the qualitative and policy/document analysis.

Key Terms: *SDGs, global pedagogies, artificial intelligence, work readiness, Industry 4.0 & Society 5.0, technology-enhanced learning (TEL)*

Date of Submission: 25-03-2025 Date of Acceptance: 05-04-2025

I. Introduction

COVID-19 as an Opportunity for Global Learning

We live in a world characterized by uncertainty and globalization which is described as a complex phenomenon constructing 'time-space compression' due to information communication technologies (ICTs)（Maggio, Ginevra, Santilli, Nota, & Soresi, 2021:251-252; Benasso, Cefalo, & Tikkanen, 2022:23-24; Özdoˇgru, 2022:177）. Current education policy reflects a rapidly changing world, where the importance of new skills and abilities has been discussed for facing the digital problems. Globalisation and the competitive market have profound effects on educational institutions（Zajda, & Rust, 2021:119）. Globalization is changing the educational landscape, and education facilitates learning about the world（Hong, 2022:24; Oades, Baker, Francis, & Taylor,

2021:326; Wangenge-Ouma, and Kupe, 2022:19）. Although the COVID-19 pandemic is the challenge to education systems, inclusive pedagogical practices and digital transformation are implemented to support teaching and learning. Schools used digital technology and platforms such as Zoom, Webex, Google meet and Microsoft teams to support synchronous online instruction（Chitiyo & Meda, 2022:301-302; Uebernickel& Thong, 2022:274; Murias, 2022:181）. The upgrading of economic industries and escaping from the middle-income trap require improving people's innovation abilities（Chu, 2022:45; Strielkowski, 2022:193; Nyland & Davies, 2022a:176;）. Education systems generally aim to better the lives of people and provide a competitive edge to national prosperity（Murchan & Johnston, 2021:4; Maslak, 2022:4）. The idea "students need to be prepared for the job markets" has led to discussions on the new pedagogical dynamics how to develop a paradigmatic change（Co¸skun, 2022:153; Volmari, Kauko, Anturaniemi, & Santos, 2022:121）.

Global Context for Key Skills–Based Reforms

For decades, education has been viewed as key to growing a nation's productivity. Globalisation has led to increased competition through global metrics such as, the Organisation for Economic Cooperation and Development's (OECD's) Program for International Student Assessment (PISA), by promoting global education standards（Bourke, Henderson, Spooner-Lane, and White, 2022:5; Pulido-Montes & Martínez-Usarralde, 2022:81; Johnston, 2021:86-87）. The current trends of globalisation and cultural diversity have created new imperatives for educational reforms（Zajda, & Rust, 2021:142）. Education 4.0, such as critical-analytical thinking, innovation, productivity and career development, can replace the competitive cultural understanding with the collaborative one（Çetin & Karsantık, 2022:198）. Globally, population ageing and its associated challenges will be present over the coming decades（Dhakal, Burgess, & Nankervis, 2022b:234）. The nature of the future workplace cannot be specified because of the development in artificial intelligence and other trends（Ng, Lee, & Chua, 2022:14）. The local communities have been trying to enhance its potential competitiveness that investing in human capital is a way of increasing the economic productivity（Thienen, Szymanski, Weinstein, Rahman, & Meinel, 2022:62-63）. This paper focuses on the United Nations Sustainable Development Goal (SDG) to achieve productive employment for the ageing workforce in the local communities, Taiwan（Sorakraikitikul & Nankervis, 2022:213-214）.

Digital Technology to Bridge the Education Gaps

The governments and businesses are pursuing the exploitation of the latest technologies, such as the robotics, artificial intelligence (AI), Internet of Things (IoT), augmented reality (AR), virtual reality (VR), 5G network, and 3D printing, etc.（Ba˘gcı, 2022:53-54; Ray & Shaw, 2022:2; Airaksinen, 2022:59）. AI grants people opportunities to make education more accessible, and to identify effective learning, so that AI is the essential power promoting educational reform（Meng, Dhimolea, & Ali, 2022:107,108; Dhimolea, Kaplan-Rakowski, & Lin, 2022:125-126; Walton & Osman, 2022:6）. With the advancement of artificial intelligence for education (AIED), students need to be capable of creating knowledge new to them（Huang, 2022:76; Krazinski & Cartier, 2022:115; Shumilina, 2022:255）. The emerging digital technologies and the educational innovations are disrupting learning so that it is an imperative to develop a new educational paradigm（Kaputa, Loučanová, and

Tejerina-Gaite, 2022:65）. OECD views skills as critical for keeping up with the new forms in the knowledge-based society and ensuring employability in the new economic order. Reformal studies in education have become inevitable for responding to the new social and economic needs（Gümü¸s, 2022:244; Benasso, Bouillet, Neves, & Do Amaral, 2022:1-3）. The educational system should prepare students for flexibility and lifelong learning, and come to play an increasingly important role in the societal incorporation of young people（Lund, 2022:23; Volmari, Sivesind, & Jónasson, 2022:351-353; Weinberg, 2022:282）.

Related Researches

Scholars do researches into the themes "SDGs, pedagogy, artificial intelligence, work readiness, technology-enhanced learning, employability and employment", and come to the conclusions as described below: First, it is important for higher education to prepare our graduates to be work-ready and equipped with relevant skills to stay employable（Ng, 2022a:3）. Second, developing work readiness will increase students' employability and employment（Ng, Teng, & Yang, 2022:61）. Third, the study seeks to predict work-ready attributes (innovation, adaptability, communication) from cognitive skills (critical thinking, application of knowledge) and motivational beliefs (intrinsic motivation, self-efficacy)（Chua, Ng, Lee, Yang, Goh, & Samhita, 2022:87）. Fourth, the rapid advancement of technologies such as artificial intelligence and robotics are disrupting the structures of labour markets and impacting the nature of work and employment（Chia & Sheng, 2022:179）. Fifth, this paper stresses on the importance of higher education on work readiness and graduate attributes, as well as job employability（Ng, 2022b:289）. Sixth, the teaching of AI is an important global strategic initiative in educating the next generation（Chiu, 2022:33）. Seventh, a series of suggestions are included for all involved with ageing populations to reach the targets of the UN's sustainable development goals（Dhakal, Burgess, & Nankervis, 2022b:231）. Eighth, if digital technology can be managed for everyone's benefit, society will be much improved（Fung & Lim, 2022:221-222）. Ninth, the implementation of immersive technologies brings about changes in the instructional design of virtual environments（Pang, Devi, Wong, Cai, & Ba, 2021:45）. Tenth, technology education should create opportunities for students to apply value judgements to enable them to become future agents of change（Harvey and Ankiewicz, 2022:117）. Eleventh, change in teacher education is key and needs to be prioritised（Seeletso, 2022:11）.

Aims, Underlying Assumptions & Method

For the young generation facing the uncertainty, educators should prepare students with essential skills and lifelong learning capacity. Exploring landscapes of education is a daunting task as it involves a great deal of differences across places. The author analyzes how a variety of local institutional, economic and opportunity structures influences the educational policies targeting youth education and labour market. This analysis provides answers to the following research questions: First, to what extent are the objectives of educational policies influenced by the national skills formation regimes? (institutional opportunity structures); Second, to what extent are the objectives of educational policies based on the local demand for skills? (economic-material opportunity structures); Third, to what extent are the orientations of educational policies influencing youth educational and employment trajectories? (discursive opportunity structures). The author examines the literature to elicit the key

themes on the "Education as a Driving Force", "Towards a Pedagogy of Artificial Intelligence", "e-pedagogies", "Technology-Enhanced Learning (TEL)", "Future Work & Human Capital", "Global Context for Key Skills–Based Reforms", "Higher Education and Social Innovation", "Upskilling—Digital Innovations in Teacher Education", and the present context in the local communities, Taiwan. This concluding part will comment on the findings of the research and make some recommendations for future research. Building on the guidelines of the literature review, document analysis is the main method used in this qualitative study. This method provides a summary on the socio-economic and educational transformations and challenges, thus identifying future research directions.

Within educational contexts of the local, there are differing understandings over what constitutes best practice with regards to institutional governance. The paper investigates the application of technology to pedagogy and explores the factors influencing the interpretation of the pedagogical value of technology. The author places such relevant discussion in the context of the Covid-19 pandemic crisis as examples of how educational governance can become more useful to address these major disruptions to how people learn and work. Referring to the Industry 4.0, Education 4.0, VET 4.0 and Society 5.0, the paper identifies the sustainability issue in line with the Sustainable Development Goals (UNESCO) and suggests possible solutions. The paper has the themes including the increased use of qualitative data in gaining insights into educational experiences, and the use of innovative learning and technology to enhance the learning experiences. The paper examines innovative technologies and controversial issues in educational reform. The author believes that this approach will provide an important departure for future research. The governance of educational trajectories is embedded in discursive and institutional frames. The author also considers the opportunity structures of the local, and understands this as an additional relevant type of opportunity structures influencing the objectives of educational policies and labour market trajectories. This design, which is shown in Figure 1, shows that the results should provide decision-makers in education policy and reforms with a better understanding of potential development trends.

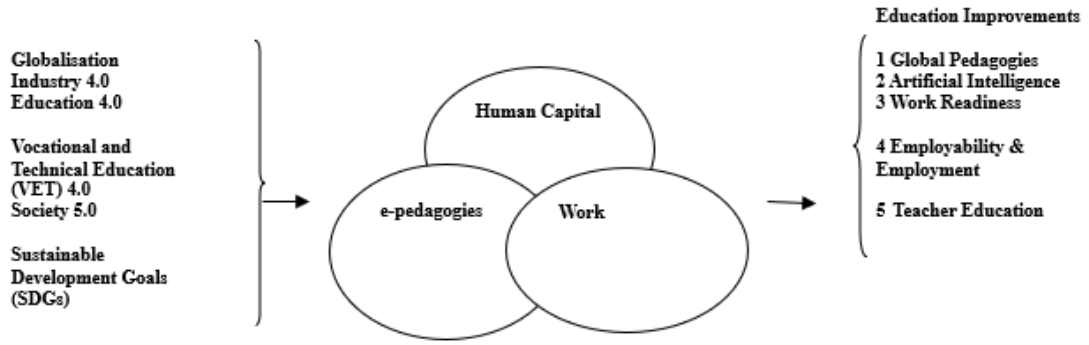

Figure 1. Research Framework

Theoretical Framework

Changing Paradigms

In the context of a globalised economy, educational system is expected to play a significant part in equipping young people with relevant skills and competencies（Murchan & Johnston, 2021:11-12）. The consequences of

social inequalities and disadvantages on young peoples' lives are significant, particularly as young people amid their school-to-work and other life transitions. The local communities tackle this issue to promote social inclusion, and to facilitate economic growth（Benasso, Cefalo, & Tikkanen, 2022:21）. Lifelong learning policies for young people aim at economic growth and social inclusion（Pandolfni, Petkova, & Verlage, 2022:63-64）.

Educational-Economic Relationships

The educational-economic relationships are discussed below. By "Education in a Global Economy", education is assumed to enhance the productivity of graduates and their contribution to the economy. By "Education in the State-as-Enterprise Economy", the public costs of education are subtracted from the lifetime income of graduates in order to show the return on investment of education. By "Education in the Welfare State Economy", the welfare state and its redistributive economy provide a safety net and reduces inequality among citizens. By "Education in the Labor Market Economy", the educational-economic relationship links higher education to the relation between the graduate as a worker and the labor market. By "Education in the Economy of the Workplace", companies hire employees based on the skills they are expected to possess（Madsen, 2022:77,80,83,84,85）. Education policies in a world of global economic competitiveness increasingly focus on establishing educational structures that face the challenges of globalisation（Lolle & Rasmussen, 2022:136）. The education political agenda demands school choice opportunities and competition between schools（Rasmussen & Dovemark, 2022:208, 209; Frankel, 2022:80）.

Education as a Driving Force

An increasingly knowledge-based economy has fostered a growing demand for graduates who possess a diverse range of skills. Work readiness is becoming an important goal of education（Ng, 2022a:4）. Education has come to be a sustainable public service（Karata¸s, 2022:12,13）. Features of Education 4.0 are follows. First, as human being is different, education enable each of us needs to be tailored course. Second, any time anywhere—education is not limited by fixed time. Third, any age—education should not have any age bar. Lack of exposure to new technologies has impacted local job growth（Halder & Sen, 2022:141,157）. The COVID-19 pandemic left educational institutions with no other alternative but to go online that the digital environment has transformed education（Andriamiarisoa, 2022:72-73）. Characteristics of a new learning model are discussed below. First, "Learning as a Business" -- education must be evaluated based on its return on investment. Second, "Learning as an Experience" -- educational institutions need to view the quality of educational services. Third, "Learners as Customers" -- customer service best practices need to be a driving force in delivering quality education. Fourth, "Learning as a Product" -- there is a growing concern about higher education's ability to provide learners with the necessary skills to equip them to join the workforce（Andriamiarisoa, 2022:79,80）.

Industry 4.0 & Education 4.0 & VET 4.0 & Society 5.0

Industry 4.0 is characterised as being based on accelerating advances and technical innovations in digitalisation leading to changes in how humans and computer-interfaces interrelate. Industry 4.0 entails the emergence of advanced technologies, including robotics, AI, IoT and robotics, big data and blockchain, AR, VR,

3D printing, and an emerging 5G network which future economic and social changes will arise, and they are emphasized as the tools that will improve students' classroom access and teaching-learning processes（Shaw and Gurtoo, 2022:6; Dufva, 2021:269; Marx, 2022:57-58）. Technology integration in education has opened the doors of Education 4.0 that is tasked with preparing the future workforce to continue societal and economic objectives. Vocational and technical education (VET) contributes to strengthening the economy, reducing unemployment, and increasing social inclusion. There are two important streams guiding the implementation of VET 4.0— digital signature pedagogy（Myridis, 2022:10; Gleason & Algarra, 2022:23; Papier, 2022:51）.

Digital Transformation

Technology and digitalization become a necessity for the society in terms of people's jobs and skills（Kaputa, Loučanová, and Tejerina-Gaite, 2022:63）. The Technology-enhanced learning (TEL) or blended learning occurs when digital technologies support learning（Chan, 2021:1,2; Özdo˘gru, 2022:179）. The digital literacy is used to promote learning and employability, so that prevent from social exclusion（Podara & Kalliris, 2022:108）. The global accessibility of massive open online courses (MOOCs) exposes users to new perspectives, enriched by socio-cultural diversity（Valentine, 2022: 39,40,42,45; Goyal, El-Taliawi, & Howlett, 2022:99-100; Schmieden, Mayer, Traifeh, & Meinel, 2022:49）. Digital learning and distance education has emerged as a pivotal approach in disseminating social innovataion ideas and new knowledge（Kaputa, Loučanová, and Tejerina-Gaite, 2022:69）. STEM education may contribute to the development of key competencies that have been identified as vital to life, such as critical thinking, creativity and communication. Especially, creativity is considered a new paradigmatic currency in education（Cahill & Petersen, 2022:273,276; Aranda & Ferguson, 2022:310）.

SDGs & ESD

The UN's Sustainable Development Goals (SDGs) is a movement to educate the new generation of globally aware citizens（Webb & Rodriguez, 2022:2; Küfeoğlu, 2022:255）. SDGs suggested three basic means of achieving the three zeros (zero poverty, zero unemployment, and zero net carbon emission), namely technology, young innovative minds (education) and good governance（Ray & Shaw, 2022:2; Noguchi, 2022:37; Webster, 2022:64）. SDG-4 is to increase young people's numeracy and literacy abilities. Increased access to higher education, as well as vocational and technical training, is emphasised（Ardoin, Bowers, Lin, & Phukan, 2022:326; Lingard, 2022:45,46）. Education plays the role in bringing societies to a certain level of resilience, and higher education is considered to be influential in achieving sustainable development. Many of the other SDGs can only be achieved through a good education（Küfeoğlu, 2022:256）. Education for Sustainable Development (ESD) presents the role of education as fundamental for achieving the values of sustainability in present and future societies（Amann, 2022:218）.

Employability and Human Capital

The knowledge, skills and values are capital. To improve the productive capacities, it would be essential to invest more into higher education as a means to raise the stock of skills of the workforce（Madsen, 2022:75,76; Chia & Sheng, 2022:181）. Human capital refers to the productive capacities of human beings. Education emerges

as the prime human capital investment, and renders a productive service of value to the economy（Zajda, & Rust, 2021:162-163; Toh, 2022:97）. Once Industry 4.0 technologies have been incorporated, businesses will need to hire more skilled worker（Enoch, Krause, Murias, & Porath, 2022:5,7-8;Hutterer, Kurianowski, & Schorp, 2022:67）. Employability is viewed as a set of attributes that graduates will be successful in their occupations（Golowko, 2021: 35,36,42）. Work readiness is defined as the skills and competencies needed to succeed in a workplace, and is an important concept that relates to graduate employability（Ng, Lee, & Chua, 2022:14, 15）. The partnership between vocational education and training (VET) and the industry is one of the keys to work readiness(Alpaydın & Kültür, 2022:104,110). With population ageing there will be workforce ageing. Investment in human development throughout life is essential（Larkin & Larkin, 2022:19,26）. Future employability requirements will change due to the fourth industrial revolution, development of artificial intelligence in the workforce, globalisation and demographic changes. These new jobs will be created whilst technological progress fosters new approaches to work（Hassock & Hill, 2022:164）.

Teacher Education

Initial teacher education for primary and secondary teachers is offered in institutions of higher education（Tatto, 2021:185）. The teacher's job required mastery of a wide range of subjects and repertoire of pedagogical knowledge to successfully handle children with different abilities（Loh, 2022:494,495; Khine & Liu, 2022:1-2）. Teachers are faced with an unprecedented change characterised by a number of factors, including diverse students and new technologies. Teachers need solid grounding in technology-enhanced teaching to acquire the skills and competencies（Seeletso, 2022:11-12）. The government stresses the need for orientation courses for teachers to enhance their knowledge about "Education for Sustainable Development (ESD)"（Mohan, 2022:510）. Digital technology will help equip teachers with the necessary skills to allows for creativity and innovation（Seeletso, 2022:18）. Delivery of curriculum online and upskilling for a transition to digital technology is essential（Mohan, 2022:510-511）. Teacher education policy has become an expression of global reform movements that policy initiatives exhibit aspects of marketisation, competition and accountability（Mayer, 2021:3）.

Local Community In Global Context: Taiwan Experience

1. Status Quo

Ageing Challenges

Taiwan is undergoing demographic changes which encompass increasing longevity and falling fertility rates that pose economic and educational challenges（Kumar, Prikshat, Chakraborti, Patel, & Raina, 2022:107）. One in four Taiwan will be 65 and older by 2032; the life expectancy in Taiwan was 81.10 in 2024 and is expected to be 82.72 by 2032. Table 1 shows that population ageing is the important feature of the forecasted population change. In 2013, aged 0-14 (%) accounted for 14.3 of population composition compared with 74.2 and 11.5, respectively, for aged 15-64 (%) and aged 65 and over (%). The dependent ratio (%) decreases from 43.3 in 1998, to 35.8 in 2010, and to 34.9 in 2013. The changes are even more visible in the development of the population projections. Between 2014 and 2061, the population will shrink by almost 25%, from 23.419 million to 17.952 million people. The labour force aging problem is especially troublesome in the labour market, where

unemployment is high. This approach to modelling population of Taiwan was triggered by the factors: massive international migration flows have changed the dynamics of national populations and, some decision makers considered international migration as a remedy for population aging. These changes will decrease the proportions of middle age groups. Between 2014 and 2061, population aged 65 and over is expected increase by 262% (from 2.812 million people in 2014 to 7.356 in 2061). The share of the population aged 15-64 is envisaged to decrease by 50% (from 17.347 million people in 2014 to 9.040 in 2061). Such changes will require significant adjustments of labour markets in order to meet the needs of an increasing number of elderly workers. This has significant implications for the labour market, economic growth and living standards. The ageing population will produce a talent shortage that demographic change will negatively impact productivity and competitiveness. The government needs to focus on developing sustainable strategies that would help to shape the future labour market.

Table 1. Population in Taiwan, End of 1998—2061.

	Population Composition					Populatio	Population Projections			
year	Percentage of population aged 0-14 (%)	Percentage of population aged 15-64 (%)	Percentage of population aged 65 and over (%)	Dependent ratio (%)	Index of ageing (%)	n annual increase rate (‰)	Total population (1,000)	Population aged 0-14 (1,000)	Population aged 15-64 (1,000)	Population aged 65 and over (1,000)
1998	22.0	69.8	8.3	43.3	37.6	8.5	-	-	-	-
2010	15.6	73.6	10.7	35.8	68.6	1.8	-	-	-	-
2013	14.3	74.2	11.5	34.9	80.5	2.5	-	-	-	-
2014	-	-	-	-	-	-	23419	3260	17347	2812
2017	-	-	-	-	-	-	23517	3020	17218	3279
2020	-	-	-	-	-	-	23559	2909	16846	3804
2023	-	-	-	-	-	-	23552	2825	16378	4348
2026	-	-	-	-	-	-	23497	2777	15810	4910
2029	-	-	-	-	-	-	23382	2644	15286	5452
2032	-	-	-	-	-	-	23192	2545	14745	5901
2035	-	-	-	-	-	-	22917	2440	14179	6297
2038	-	-	-	-	-	-	22554	2317	13650	6588
2041	-	-	-	-	-	-	22111	2178	13057	6876
2044	-	-	-	-	-	-	21601	2038	12387	7176
2047	-	-	-	-	-	-	21031	1912	11682	7437
2050	-	-	-	-	-	-	20414	1805	11070	7539
2053	-	-	-	-	-	-	19766	1720	10551	7495
2056	-	-	-	-	-	-	19097	1652	10000	7445
2061	-	-	-	-	-	-	17952	1556	9040	7356

Source: Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, R.O.C. (Taiwan)

Education Improvements

Taiwan recognised the need to prepare students for an increasingly globalised and knowledge-based economy. This led to the implementation of curriculum development and educational reform which sought to enhance students' critical and creative thinking skills. Recognising the importance of bridging school success and work readiness, Taiwan seeks to predict work-ready attributes (such as innovation, adaptability, communication). Taiwan sought to revitalize core values for the educational system by emphasizing the fundamental pillars for school levels: First, promoting quality with equity, Second, building a high-quality teaching, Third, steering accountability focused on improvement（Magnúsdóttir & Jónasson, 2022:154-155; Nordin & Wahlström, 2022:233-234）. Over the last decades Taiwan has redesigned governance modes in education to increase competition. Taiwan is undergoing school curriculum changes, such as strengthening information and communication technology (ICT) education, English as a second language (ESL), and science/technology/engineering/arts/mathematics (STEAM) education, and teachers are expected to also be flexible in responding to these changes. A new initiative was launched to push the school system and improve its performance, such as the Program for International Student Assessment (PISA). Table 2 illustrates changes in the Achievements of 15 Year Olds Students on the Programme for International Student Assessment (PISA), Year 2022. Taiwan ranked 5th for Reading compared with third and fourth respectively, for Mathematics and Science. In attempt to regain Taiwan status in reading skills in the world rankings, policies were developed to improve literacy skills. Many teachers encouraged their students to read more books and they developed learning materials to improve students' reading skills. PISA seems to play a part in bringing this educational globalization about, and students can aspire for a better international career when they get higher scores in PISA tests. International performance data has had a significant impact as a catalyst of educational reform. This shift was inspired by the desire to produce graduates who are creative and innovative.

These reforms address school curriculum objectives. First, choice -- these education policies have entailed shifts from state control or big government towards governance and efficient free markets. The transition to new modes of governance is associated with less state and more market, involve the promotion of competition and choice. Taiwan had introduced a compulsory school to provide general education for all children. After finishing compulsory schooling, students can choose between upper secondary schools and among various academic and vocational preparatory programs. This represents an attempt to broaden the range of options for students' educational choice paths. Second, access -- access to education is provided through various market mechanisms, which enable students to choose schools based on preferences rather than residential area. The minimum school leaving age is being increased from 16 to 18 years because Taiwan has expanded its compulsory education. The upper secondary school programmes, general as well as vocational, would open up for future study opportunities. Reforms of marketisation and students' freedom of choice were combined with a universal admission for university studies. Such an education for all students would prepare them for a rapidly changing labour market and lifelong learning.

Table 2. Achievements of 15 Year Olds Students on the Programme for International Student Assessment (PISA), Year 2022

Rank	Reading			Mathematics			Science	
	Country	Mean Score		Country	Mean Score		Country	Mean Score
1	Singapore	543		Singapore	575		Singapore	561
2	Ireland	516		Macao	552		Japan	547
3	Japan	516		**R.O.C.**	**547**		Macao	543
4	Republic of Korea	515		Hong Kong	540		**R.O.C.**	**537**
5	**R.O.C.**	**515**		Japan	536		Republic of Korea	528
6	Estonia	511		Republic of Korea	527		Estonia	526
7	Macao	510		Estonia	510		Hong Kong	520
8	Canada	507		Switzerland	508		Canada	515
9	United States	504		Canada	497		Finland	511
10	New Zealand	501		Netherlands	493		Australia	507
11	Hong Kong	500		Ireland	492		New Zealand	504
12	Australia	498		Belgium	489		Ireland	504
13	United Kingdom	494		Denmark	489		Switzerland	503
14	Finland	490		United Kingdom	489		Slovenia	500
15	Denmark	489		Poland	489		United Kingdom	500
16	Poland	489		Austria	487		United States	499
17	Czech Republic	489		Australia	487		Poland	499
18	Sweden	487		Czech Republic	487		Czech Republic	498
19	Switzerland	483		Slovenia	485		Latvia	494
20	Italy	482		Finland	484		Denmark	494
21	Austria	480		Latvia	483		Sweden	494
22	Germany	480		Sweden	482		Germany	492
23	Belgium	479		New Zealand	479		Austria	491
24	Portugal	477		Lithuania	475		Belgium	491
25	Norway	477		Germany	475		Netherlands	488
26	Croatia	475		France	474		France	487
27	Latvia	475		Spain	473		Hungary	486
28	Spain	474		Hungary	473		Spain	485
29	France	474		Portugal	472		Lithuania	484
30	Israel	474		Italy	471		Portugal	484
	OECD (Ave.)	476		OECD (Ave.)	472		OECD (Ave.)	485

Source: Ministry of Education, R.O.C. (Taiwan)

1.3 Labour Market

Access to the labour market is shaped by the opportunities produced by economic conditions and the socio-institutional context. Taiwan's labour market policies have increasingly articulated employability and unemployment. Employability was understood as matching the individuals' competences with the needs of the labour market. The notion of opportunity structures has been used to shed light on the complex governance of the educational trajectories, which are shaped by wider socio-economic and institutional influences. In school-to-work transition studies, opportunity structures have been employed to explore the ways in which structuring agents, such as labour market, family background or education, frame young people's choices and accomplishments. Taiwan is influenced by globalisation, digitalisation and demographic change. The changes that COVID brought to education and work called attention to the need for up-skilling. The economic recovery requires attention towards reforming structures in sectors such as education to increase productivity.

By 2024 Taiwan's unemployment rate was 3.38 per cent, which is shown in Table 3. These slightly increased unemployment rates understate the extent of hardship experienced by young people as a result of the crisis. In the 2024, youth (aged 15 to 24) unemployment had reached 11.27 per cent, compared with 3.47 per cent for the adults (aged 25-44 years). By 2024 Taiwan's labor force participation rate was 59.3 per cent, which is shown in Table 4. In 2024, youth (aged 15 to 24) accounted for 37.2 of labor force participation rate compared with 91.0 and 67.2, respectively, for the adults (aged 25-44 years) and the adults (aged 45-64 years) services. The major problem of the Taiwan labour market policies are the worryingly high level of unemployment and the development of atypical forms of employment. Young people are finding themselves without a job and potentially falling into long-term unemployment. This will raise crucial issues if it results in a process of increasing job insecurity and increasingly precarious living standards.

Taiwan has adopted a more activating approach to labour market policy towarding the principle of encourage and challenge. More young people receive a university entrance qualification and choose to study instead of entering vocational training. The decreasing number of school graduates seeking vocational training has led to a growing number of initiatives aiming to attract new talents and prepare future generations for the challenges of Industry 4.0. The government has started initiatives to support the vocational education sector that the objective is to convince more young people for which vocational training is available. The education system needs to prepare for further technological advancement, so that the young people need to develop technical skills to keep up with the change. Because the biggest number of unemployed and unqualified young people has been between 15- and 24 years old, the "Active Labour Market Policies" aims to help working-age population to integrate within labour market. The realignment of the educational and training systems combined with the motto "the society of tomorrow is the curriculum today.

Table 3. Unemployment rate in Taiwan, End of 1998—2024.

	Total	age				educational level		
	(%)	15-24 years (%)	25-44 years (%)	45-64 years (%)	65 years and over (%)	Junior high & below (%)	Senior high & vocational	Junior college & above (%)
year								

							(%)	
1998	2.69	7.32	2.26	1.44	0.19	2.28	3.09	2.80
2009	5.85	14.49	5.93	3.90	0.13	5.84	6.19	5.57
2010	5.21	13.09	5.35	3.39	0.19	4.83	5.58	5.12
2013	4.18	13.17	4.27	2.25	0.14	3.53	4.11	4.50
2024	3.38	11.27	3.47	2.16	0.65	2.13	3.21	3.74

Source: Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, R.O.C. (Taiwan)

Table 4. Labor force participation rate in Taiwan, End of 1998—2024.

year	Total (%)	15-24 years (%)	25-44 years (%)	45-64 years (%)	65 years and over (%)	foreign workers in Taiwan (1,000)
1998	58.0	36.0	79.2	60.8	8.5	271
2009	57.9	28.6	84.2	60.3	8.1	351
2010	58.1	28.8	84.7	60.3	8.1	380
2013	58.4	29.6	86.6	60.7	8.3	489
2024	59.3	37.2	91.0	67.2	9.9	

Source: Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan, R.O.C. (Taiwan)

II. Discussion

Risk is global and resilience is local. “Living with uncertainty” is becoming core to post COVID-19 lifestyle. The author discusses the educational reform in the age of globalization, with reference to structural adjustment and educational reform of the local. Numbers of options are available to increase educational services. First, the government could rely on the local community to pay for its educational services. Second, education might be privatized. Third, parents might be charged user fees. All three options have become standard structural-adjustment policy that education is not just a public good but a private good（Zajda, & Rust, 2021:101,102）.

Technology-Enhanced Learning (TEL)

The COVID-19 pandemic ushered the re-imagined pedagogical possibilities for digital technology and online education that using interactive apps, platforms, TVs, and YouTube videos for teaching-learning. MOOCs, Open Education Resources (OERs), and other online program management (OPM) providers, have emerged as a significant part of the online learning landscape. Schools took online turn to manage remote learning（Shaw and Gurtoo, 2022:13; Damooei, 2022:169; O’Connor, 2022:20,21; Shah, Pabel, & Richardson, 2021:7-8; Afsharinia, Gurtoo, and Shaw, 2022:27）. Those governments worldwide redesigned the educational system by innovative approaches like technology-enabled support（Kumar, Mukherjee, Belousova, & Nair, 2022:3,4; Saloojee &

Lachemi, 2022:35,40,41; Al-husban & Waghid, 2022:64; Ossiannilsson, 2021:101;）. Digital transformation heralds the fifth stage of society—Society 5.0 that focuses on application of technology in constant development and innovation stimulated for Industry 4.0 to solve mankind problems such as population ageing, natural disasters, social inequality and improving people's quality of life. Social Innovation can combine new technologies such as IoT, AI, Robotics, Big data with Advanced Analytics. Educating individuals to produce innovative ideas as a solution (creative thinking) is of importance（Mitra and Chaurasia, 2022:369,370; Co¸skun, 2022:152,161）.

Towards a Pedagogy of Artificial Intelligence

Digital technology has enabled the world to be connected. Those who were able to work digitally during the Covid-19 pandemic continued to enjoy learning（Fung & Lim, 2022:222）. The frontier technologies namely AI, IoT, big data, blockchain, 5G, 3D printing, robotics, drones, gene editing, nanotechnology, and solar photovoltaics, increase the competitiveness of economies, and contribute to 2030 agenda for sustainable development（Srivastava, Sarkar-Swaisgood, Kim, and Dewi, 2022:359,363; Yadav, Joshi, & Yadav, 2022:158; Joshi, Yadav, & Yadav, 2022:263,265）. The digital world presents information, has created a new learning environment（Gümü¸s, 2022:245）. Artifcial Intelligence for Education (AIED) has been used for ITSs (Intelligent Tutoring Systems) and classroom orchestration systems（Huang, 2022:81,82,87）. Pupils should learn about the opportunities of modern technology. Furthermore, education should prepare pupils for future learning（Norström, 2022:42; Malavasi & Righettini, 2022:184-185）.

Social Inclusion and Digitally Learning

The rapid growth in digital services, IoT, Industry 4.0 and 5G-based application provides a flexible learning platform that allows teachers and students to work together（Goudarzi, Ilager, & Buyya, 2022:3,5; Abiodun, Awotunde, Adeniyi, Ogundokun, & Misra, 2022:334）. The adoption of the educational technology has been promoted as a solution for the issues surrounding diversity, equity and inclusion（Taylor, Dewsbury, & Brame, 2022:36; Jørgensen, 2022: 50-53）. These educational services, AI and ML, generate courseware products with adaptive learning pathways to student needs, and open new ways to achieve learning goals（Arango-Caro, Walsh, Wester, & Callis-Duehl, 2022:472）. AI-based robot teaching assistants are used for: first, analyzing student learning motivation, attitude and behavior, second, understanding learning styles of students, third, supporting diversified learning methods, and four, learning outcome prediction. Deep learning is a machine learning method. Application of AI and ML offers opportunities to revolutionize education by assisting teachers' teaching while impacting students' learning（Meng, Dhimolea, & Ali, 2022:110-112）.

Future of Work

The future of work indicates many changes as society and economies shift to Industry 4.0 with co-relationships between work, information technologies and economic challenges. Industry 4.0 refers to the application of digital technologies to manufacturing processes. Education 4.0 describes the need to ensure all levels of education help prepare graduates for the future of work. VET 4.0 can be envisaged as providing the impetus to ensure VET graduates are equipped to participate in Industry 4.0（Chan, 2021:50）. Higher education

is in a marketplace where academic institutions adapt to the market's demands to upskill the workforce and focus on lifelong learning（Ramlall, Cross, & Love, 2022:3）. The future of higher education will include the usage of technology from blockchain networks to computer simulations to AI（Ramlall, Cross, & Love, 2022:7-8）. Obtaining digital skills can allow students to gain competitiveness as well as enhance creativity（Mikulevičiūtė, 2022:146-147, 150-151）. The collaboration between higher education and industry provides an engine for economic growth（Trajkovski, Killian, & Coen, 2022:283-284）. Vocational education should prepare students for employability and that a well-educated workforce is the best way to compete in a globalized world（Lund, 2022:28-29）.

Global Context for Key Skills–Based Reforms

During the Covid-19 pandemic, the adoption of a blended learning approach, a mixture of online and face-to-face learning, becomes necessary in higher education（Dryjanska, Kostalova, and Vidović, 2022:110; Anyolo & Tshiningayamwe, 2022:143-144）. To enable technological progress and economic growth, and to keep communities competitive, investment in skills is needed（Golowko, 2021:13-14）. There has been a reorientation globally towards aligning educational reforms on the basis of key competencies or skills. Such competencies perceived changes in respect of the world of work and facilitated by developments in respect of digital technologies（Johnston, 2021:86,87）. Opening the world of work to young people is one of the development challenges in an increasingly knowledge-based global society. The teaching of AI in K-12 curricula is an important global strategic initiative in educating the next generation. A quality curriculum should be designed in an inclusive manner to enable students to develop the knowledge, skills and values, which lead to productive lives（Dhakal, Burgess, & Nankervis, 2022a:8-9）.

Higher Education and Social Innovation

Higher education is ascribed value in terms of its utility for the economy, is considered an investment in the productivity of graduates, and is understood to be sources of competitive advantage in a knowledge-based economy（Meissner, Gokhberg, Kuzminov, Cervantes, and Serger, 2021:3）. Higher Education Institutions had to embrace digital technology so that education must be a priority（McDonnell-Naughton and Păunescu, 2022:11-13）. Higher education plays a significant role in creating better youth employment opportunities, and creating impactful research that generates sustainable socio-economic returns（Nyland & Davies, 2022b: 192; Liddle and Addidle, 2022:36; Wangenge-Ouma, and Kupe, 2022:19）. Higher education can play an important role in the realization of the SDGs that key competencies represent broader skills（Webb & Rodriguez, 2022:4,6）. Massification of higher education not only means higher participation in higher education, but also a greater diversity of providers of higher education that choice flows across borders. The marketization of higher education includes market-oriented strategies like the introduction of tuition fees, decentralization and institutional autonomy（Hong, 2022:140,141）.

Upskilling—Digital Innovations in Teacher Education

The changing nature of digital technologies and how they are used in society will present challenges for educators whom needed to respond to this changing education and embrace online digital pedagogies. The transition from a face-to-face mode of teaching and learning to an online mode is a new experience for many（Nykvist, Mukherjee, and Blundell, 2022:248）. When teachers have better problem-solving skills with good technological opportunities, students also have better problem-solving skills and performance（Gümü¸s, 2022:249,250; Nykvist, Mukherjee, and Blundell, 2022:256）. The organization of teacher education is a central issue in efforts to improve the education systems（Gümü¸s, 2022:243）. The policies that created new-generation teacher systems should improve teaching or learning, and associated measures of effective teaching should impact achievement or equity. The local communities added licensure exams specific to reading, in order to ensure preservice teachers with adequate content and pedagogical content knowledge. It is hoped that a new set of standards and assessments of teacher knowledge will impact students in any meaningful way（Gabriel, 2022: 180,181）.

III. Conclusions And Suggestions

1. Challenges and Issues

Global Pedagogies

Preparation for future learning is understood as the ability to learn new information from available resources, and demonstrate innovation and flexibility in problem solving. Today's educators have ample opportunity to explore the use of augmented reality, virtual reality and AI in teaching（Lisk, Mylopoulos, & Woods, 2022:566, 573-575）. It must be a landscape that provides young people with the opportunity to become professional learners who deal with the challenges in a creative manner. Improving a worker's socio-economic status, career opportunities and income, play a significant role in driving the economic performance. Education emerges as the prime human capital investment, and raises the productivity of workers. Being alert to issues of inclusion and sustainability will be even more important in the future（Benasso, Bouillet, Neves, & Do Amaral, 2022:8; Byrne, 2021:201）. Education becomes an investment for the economic growth. Employment opportunitie and attention to the population's wellbeing, contributed to career choices. Pedagogy in Education 4.0 responds to the demands of Industry 4.0 and gives new impetus to the transformations in education. Those school leaders have to encourage change, and make change sustainable（Çetin & Karsantık, 2022:205; Maggio, Ginevra, Santilli, Nota, & Soresi, 2021:253）.

Challenges with Artificial Intelligence

A pedagogy of AI moves from the skillful management in the possession of human beings, even in the scientific sophistication of ML and big data（Malavasi & Righettini, 2022:188）. AIED brings new opportunities. AI is impacting education on the following perspectives. First, AI can drive school efficiency and streamline teacher tasks. Second, AI may address challenges in education, especially in terms of access and inclusion. Third, AI could fill needs gaps, extending learning opportunities. Fourth, AI can empower both teachers and students with enhanced learning experiences（Wang & Cheng, 2022:5-6; Sharma, Soetan, Farinloye, Mogaji, and Noite,

2022:162）. AI will transform the future of work in students' lifetime, and educational institutions have the imperative to implement institutional strategies geared towards AI readiness（Andriamiarisoa, 2022:82）. AI systems resulted in enabling self-servicing paradigm, where public can meet their needs by interacting with ITSs（Arunagiri and Udayaadithya, 2022:415）. AI provides new horizon for educational and industrial use that offers potential for youth（Maslak, 2022:176）. The future of learning is reliant on the use and integration of AI-driven solutions that can be used to break new barriers and revolutionize learning（Andriamiarisoa, 2022:75）.

Work Readiness

As emerging markets have experienced rapid social and economic developments, it is critical to prepare our graduates with relevant skills and work-ready attributes. Job employability not only benefits the graduates, but also the workforce and the economy（Ng, 2022a:4）. If graduates are able to make a smooth transition from school to the workforce and become productive employees, the effort to prepare them for future work ought to be a multi-stakeholder endeavor. The expanded higher education system has continued to be dominated by vocational concerns—what industry requires. Young people have different living conditions and they are faced with a wide variety of institutional and structural settings. The interplay between education systems, labour markets and skills ecologies occurs at different levels, resulting in different opportunity structures（Ng, Lee, & Chua, 2022:13-14）. The new paradigm shift in pedagogy is dictated by forces of globalisation, knowledge society and ICTs that have profound effects on educational institutions（Ng, Teng, & Yang, 2022:78,80）.

Employability and Employment

Changing jobs or workplaces will continue to be faster in the future due to all kinds of crises, technological, demographic and other structural changes. Therefore, acquiring new skills and updating existing ones will become even more crucial. In the field of employment, workers need to have training that helps them to keep their skills up to date（Murias, 2022:188）. In the field of education, it proposes measures to promote great development of students' skills and to increase the weight of degrees in technical or STEM (science, technology, engineering and mathematics) subjects. It needs to promote a reform of the employment training system so that it adapts to the needs of the digitalisation（Berk, 2022:149-150）.

Teacher Education Within Contexts of Super-Diversity

Teachers must address pupils with diverse backgrounds as well as numbers of those with special needs. Teaching is a moral enterprise, because teachers have a duty of care for people, and are pivotal in building the capacity for social cohesion. Teacher quality and teacher education reform, must point towards the social engineering for the benefit of the privileged and the poor. Teacher education has a moral duty to centre the preparation of teachers for contexts of super-diversity（Mayer, Goodwin, & Mockler, 2021:217-218）. Increasing employability in competitive economic structures, equipping those workforces with global competitiveness, and the foreseen requirements of future professions, have forced the local communities to reform teacher education. The framework of technological pedagogical content knowledge (TPCK) requires understanding the relationships among technology, pedagogy and content（Gümü¸s, 2022:255）. The digital technologies are one of the major

sources of risk and change, and teachers would be comfortable with working with risks and change（Olivier, Oojorah, & Udhin, 2022:4）.

IV. Limitations And Implications

Outlook for Future Research

(1) Opportunities for Future Education

The local educational futures will be influenced by the global challenges. We should be able to grasp the scale of the educational precarity by socio-economic crisis, job losses and the ill-health due to COVID-19（Osman & Walton, 2022:181-182）. It seems valuable social resilience and risk-taking as poor people are forced to tackle poverty for gaining not only a survival but also a well-being（Giossi & Giavrimis, 2022:140）. EdTech programmes create innovative technological solutions and would help to enhance the education sector. This would help to improve the quality of education delivery and tackle the challenges that the education faces（Mikulevičiūtė, 2022:148-149）. The distance/digital/online education establishes a hybrid education model that will function more healthily in the future（Baˇgcı, 2022:64-65）. There needs to be a willingness to imagine different ways in which technology can be used to improve the quality of life for all without risking that of future generations（Davison, 2022:280）. Digitalisation has created new opportunities that have allowed more sustainable strategies to be developed（Murias, 2022:189-190）. The government should accumulate relevant knowledge and experience of coping with massive online access for education in responding to the national crisis（Cha & So, 2021:289,290）.

(2) Preparing for Industry 4.0 & Education 4.0 & VET 4.0 & Society 5.0

Technology in schools are effective factors in preparing societies for Industry 4.0, Education 4.0, VET 4.0 and Society 5.0. Those higher education students showed their use of educational technologies as well as computers and smart phones to affect the abilities of the Industry 4.0 society. The changes in the national education systems can be said to have triggered the industrial transformation. Students acquire the basic values for being able to cope with the world of the future that is predicted to change structurally in their future（Co¸skun, 2022:160, 163-164）. Education 4.0 is believed to empower students in terms of innovations; thus, increasing their success levels and learning outcomes. In order to meet the increasing demands for excellence in education, schools should become effective leaders by gaining new skills and abilities（Çetin & Karsantık, 2022:206）. Education should be aligned with the fourth industrial revolution, which has changed the ways people work and learn（Ossiannilsson, 2021:107）. Students should be able to create their solutions to the problems that impact life and society locally and globally. Moreover, they should learn and implement various techniques and skills of AI technologies.（Chiu, 2022:35）. Further research should be done to probe how the use of immersive technologies such as AR,VR, XR, IoT and AI, can be used in tandem with learning devices at all school levels（Pang, Devi, Wong, Cai, & Ba, 2021:58）.

(3) Technology as an Enabler

Many emergent technologies have the potential to transform higher education's optimization of pedagogy through adaptive learning (AL) and XR, including AI, learning analytics, and next-generation digital learning environments (NGDLEs). The other approach, XR, AR and VR, are emerging as educational tools due to their

potential to replace standard instruction during the pandemic. NGDLEs are transforming institutions' learning ecosystems by providing a more flexible learning experience to students（Arango-Caro, Walsh, Wester, & Callis-Duehl, 2022:470-471, 481）. As emergent technologies of AL evolve, AI, ML, learning analytics, and NGDLEs will offer institutions a learning ecosystem. Technology is employed as an enabler of learning experiences and in which students are creators（Baˇgcı, 2022:56-57; Johnston, 2021:93-94）.

(4) Eliminating Age Discrimination

The population and workforce are ageing due to declining birth rates and increasing longevity. People are living longer, but this demographic change is beginning to have consequences for employment, and calls into question the maintenance of living standards and the sustainability. To tap the potential of older workers, the government should include these priorities: reform of pension systems, measures to encourage later retirement and appropriate career guidance（Murias, 2022:192,195）. Eliminating age discrimination is not only good for equity but also takes advantage of the experience and skills of older workers; and it is possible for supporting phased retirement through the extension of normal employment conditions to part-time, casual and contingent workers. Further research should consider key issues such as approaches : supporting an ageing workforce, improving the health of an ageing population, and active ageing and ageing with dignity（Dhakal, Burgess, & Nankervis, 2022b:240）.

(5) Toward Skills-Biased Technological Change

Higher education, employers and policymakers need to work together to develop a more flexible graduate to succeed in an uncertain and disrupted future, and will play a role in retraining the future workforce by updating labour policy to match the realities of the Fourth Industrial revolution（Hassock & Hill, 2022:171, 172）. The prospects for human capital in the labour market have become much more complex. Skills-biased technological change (SBTC) offers a nuanced perspective of the role of higher education vis-à-vis technological change. It would be critical to invest in a high-quality education that is keeping pace with the SBTC in the labour market, and to drive higher levels of technological innovation（Chia & Sheng, 2022:181,182）. The government will need to address the impact of new technologies on the labour market as well as upgrading education policies and soft skills to leverage human talent. Industries will need to upskill their current workforce in the use of new technologies and workers will need to take personal responsibility for their own lifelong learning and career development. There will be demand for professions who can blend their digital and STEM (science, technology, engineering and maths skills) with creative skills for human and machine interaction（Hassock & Hill, 2022:164; Murias, 2022:188-189）.

(6) Dynamic Working World

It is essential to equip university students with the relevant work-ready attributes to prepare them for the dynamic working world. First, government should advocate the importance of work-based experiences such as internship. Second, universities should educate their students by informing them of their employability skill requirements. Third, government should explore the process of graduate employability and its relation to lifelong

employability. Universities and industries should communicate to allow better understanding of workplace skills（Ng, 2022b:290, 291, 292; Ng, Lee, & Chua, 2022:30）. It is important to analyse how "Career Guidance and Counselling" is adapted to the current socio-economic, educational and employment context to find out what the new trends in help young adults to apply them to the workplace（Mikulevičiūtė, 2022:158; Murias, 2022:189-190）.

Limitations of Study

However, there are still some limitations to this study. First, the present study was cross-sectional, and data were collected from the local communities, Taiwan. For future research, the instrument could apply across other institutions for the findings. Second, the research did not examine the causal relations among all attributes of work readiness. Future research could assess these relations among the attributes and then longitudinally assess these attributes on career success. Third, this study focused on only educational reform in Taiwan, and cultural difference may exist. As cultural difference is not the intent of this study, future research could be conducted in other cultural contexts as a comparison. Lastly, the findings could not be generalise to the industry sectors or university faculties. It is likely that different sectors and disciplines will emphasise different characteristics and skills. Work readiness in Taiwan is a social construct that is cultural-dependent. One possibility for future research would be to conduct similar studies in different regions, especially because the job market is becoming increasingly internationalised and the migration and mobility of talents are on the rise.

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