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ORIGINAL RESEARCH

International mutual recognition of vocational education learning outcomes: Proposal and practice in China

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Abstract

The accelerating globalization of the labor market and rapid technological transformation necessitate an internationally applicable framework for recognizing vocational education and training (VET) learning outcomes. While efforts like United Nations Educational, Scientific and Cultural Organization's (UNESCO's) World Reference Levels (WRL) and the European Qualifications Framework (EQF) have established foundational principles, they face challenges in global implementation and cross-border comparability. This paper introduces a pragmatic and systemic proposal, the International Mutual Recognition Scheme for Vocational Education Learning Outcomes (IMRVELO), often referred to as the Shenzhen Accord. The IMRVELO scheme is developed in the context of China's large-scale VET system and its strategic Going Global with Industries initiative. The core contribution of the scheme lies in its four-level International Vocational Education Levels (IVEL), a novel 3 x 8 x 24 Objectives Taxonomy (covering Foundational, Operational, and Developmental Compe-tencies), and a flexible yet quality-assured Curriculum Framework based on substantive equivalence. This proposal aims to provide a functional and immediately implementable mechanism for credit accumulation and transfer, thereby enhancing the quality, adaptability, and equity of VET globally.

Keywords

vocational education and training, international mutual recognition, learning outcomes, Qualifications Frameworks, Shenzhen Accord

INTRODUCTION

The early 21st century is defined by two converging forces profoundly impacting the vocational education and training (VET) sector: the latest wave of technological and industrial transformation and the sustained globalization evidenced by nearly 281 million migrants out of the global population in 2020 (Mcauliffe & Khadria, 2019). For globally mobile populations, the recognition of vocational skills is a fundamental prerequisite for securing employment and accessing continuing education (Donlevy *et al*., 2016). Simultaneously, the demand for new digital and adaptable skills, superseding traditional manual abilities, has intensified the need for internationally comparable and transferable vocational standards.

In the context of transnational technical and vocational education and training (TVET) cooperation, a persistent challenge is the lack of standardized hierarchy and evaluation criteria (Gao, 2020). Unlike general education, VET systems are decentralized and administered diversely across nations (Billett, 2011), resulting in a proliferation of

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nonaligned diplomas and skill certificates. Such institutional fragmentation has impeded the recognition and conversion of learning outcomes, thereby creating barriers to labor mobility and international industrial collaboration.

This critical gap was addressed in this study through the International Mutual Recognition Scheme for Vocational Education Learning Outcomes (IMRVELO), whose development was initiated in 2020. The paper presents a review of existing international frameworks, followed by an outline of how the IMRVELO proposal was formulated. We then elaborate on the systemic architecture of the IMRVELO project, demonstrating its potential as a workable global solution to the lack of international mutual recognition of VET learning outcomes.

LITERATURE REVIEW

International efforts on the mutual recognition of TVET learning outcomes

The relationship between globalization and the mutual recognition of TVET learning outcomes has been documented in various theoretical and empirical studies. For example, some scholars have pointed out that the intensification of globalization in recent decades has progressively promoted connections between countries, thereby generating new demands in the field of vocational education (Acharya, 2023; Spoettl & Loose, 2015). More specifically, Tran and Dempsey (2017) argued that globalization has been a significant driving force for the internationalization of TVET, amplifying the need to recognize skill qualifications in foreign countries. Similarly, Mcauliffe and Khadria (2019), who used global migration statistics in 2020 as bases for their analysis, asserted that the recognition of vocational education qualifications has become a globally urgent problem due to increased migrant populations and the critical roles of qualifications in helping immigrants access employment opportunities and achieve professional success.

The attempts of international organizations to address the recognition of immigrants' skill qualifications have been analyzed (Brockmann *et al*., 2009; Maurer, 2021; Méhaut & Winch, 2011) because of their indispensability in advancing such acknowledgment across borders. Global institutions have implemented initiatives that have profoundly affected the recognition of immigrants' competencies and credentials, albeit additional measures are necessary (Brockmann *et al*., 2009; Wei & Zeng, 2025). A project that has drawn considerable attention is the World Reference Levels (WRL) established by the United Nations Educational, Scientific and Cultural Organization (UNESCO) given the involvement of a strong policy advisory role for national governments (Bray, 2014).

UNESCO initiated the WRL project in the hope of clearly defining the qualifications that can satisfy the newly emerging needs of the global labor market and address challenges pertaining to the recognition of immigrants' skills and qualifications (Cedefop, 2019). UNESCO reported that the development of the WRL dates back to the third TVET International Conference held in Shanghai in 2012, during which the Shanghai Consensus was issued to establish a framework for regulating the construction of learning outcome-based qualification certification systems and facilitating the mutual recognition of TVET qualifications. After a series of seminars, symposia, and discussions, June 2017 saw the development of a WRL model that comprises 11 competency elements, 8 levels of progression, and 51 indicators of achievement. In 2023, the WRL project advanced to the stage of supplementing a necessary tool for both practical implementation and the assessment of its real-world effects (UNESCO, 2023). The model stimulated strong interest in the mutual recognition of TVET learning outcomes in academia, but only some parts of the content of such a model have been openly released to date, thus preventing the WRL from effectively benefitting endeavors devoted to the aforementioned recognition.

Regional efforts on the mutual recognition of TVET learning outcomes

The mutual recognition of TVET qualifications has been central to research on and the implementation of regional qualifications frameworks. According to the Global Inventory of Regional and National Qualifications Frameworks (NQFs; Cedefop, 2019), seven such frames of reference at the regional level have been established worldwide, including the European Qualifications Framework (EQF), the Qualifications Reference Framework of the Association of Southeast Asian Nations (ASEAN), and the Pacific Qualifications Framework. Such frames of reference lend themselves well to the recognition of the TVET qualifications of neighboring countries (Shen, 2017), yet there is a lack of cross-border coordination mechanisms, which leads to insufficient resource support, slow response to changes in skill demands, and inferior results in mutual recognition. In short, many flaws plague the development and use of regional qualifications frameworks as guidelines for mutually acknowledging TVET learning outcomes.

Of the abovementioned regional frameworks, the EQF for the reciprocal recognition of cross-border workers' qualifications has provoked notable responses from both policymakers and researchers for its functions and significant achievements (Bohlinger, 2019; Young, 2008). Elken (2015), for instance, pointed out that the EQF is an international mechanism for the regional mutual acknowledgment of lifelong learning qualifications. Its purpose is to establish

a common reference standard for such validation grounded in respect for the diversity of qualification systems in EU member states (Europass, 2020).

As a supplementary yet essential component of the EQF, the European Credit System for Vocational Education and Training (ECVET) has been examined for its rationales, mechanisms, functions, and effects (Du, 2011; Sun *et al*., 2013; Sun & Feng, 2019; Wang *et al*., 2012). The ECVET was established, according to the European Union, to break down barriers to the delivery of vocational education by member states and to promote the mobility of learners as well as the reciprocal recognition of skills and qualifications (Cedefop, 2009). Its credit transfer and accumulation process centers on learning outcomes, as indicated in documents related to ECVET operation (Sun & Feng, 2019). The presence of unified standards is indispensable to credit transfer from one situation to another to ensure the validity and reliability of the transferring result (Sun & Feng, 2019). The ECVET's quality assurance mechanism is key to ensuring the comparability of TVET curriculum content and evaluation benchmarks across countries and institutions. Nevertheless, although its functions and successes have been widely acknowledged by both researchers and policymakers, its use in many countries, including some European nations, is significantly influenced by differences in cultures and educational institutions (Du, 2011). Hence, the ECVET presents intrinsic problems for the mutual recognition of TVET learning outcomes in non-EU countries.

Existing efforts extended at the international and regional levels illustrate that even though many lessons can be borrowed from projects such as the WRL and ECVET, a framework for the international mutual recognition of TVET learning outcomes remains lacking.

DEVELOPMENT OF THE IMRVELO

The proposal for IMRVELO is deeply rooted in practical experiences of developing and internationalizing China's vocational education system. As the world's largest TVET system, China has built a vocational school network of remarkable scale and structural completeness. As of 2024, the system comprises 8475 vocational schools, with a total enrollment of 30.3467 million students and 1.4917 million full-time teachers. Vertically, the system is fully articulated across educational levels: 51 undergraduate-level vocational schools (as of March 2026, the number has increased to 102), 1562 higher vocational colleges (junior college level), and 6862 secondary vocational schools (Ministry of Education, 2025). Horizontally, the system offers 1434 specialty programs across 19 professional categories, effectively meeting the diverse needs of economic development. Beyond the school-based system, China has also developed a comprehensive vocational skills training framework that comprises enterprise-led autonomous training and market-oriented social training as the main services, supplemented by government-subsidized training initiatives. In addition, a well-structured vocational skills competition system further supports quality assurance and skill development. Overall, these achievements covering scale, structural articulation, specialty coverage, and complementary training mechanisms provide experts with the motivation and experience to develop an exhaustive proposal for the international recognition of TVET learning outcomes.

China's policy on internationalization in the TVET sector created an inspiring context within which to formulate the IMRVELO proposal. This context is built upon a solid domestic foundation, further expanded through a series of international initiatives, and finally directed toward the goal of establishing globally recognized standards for mutual recognition. First, since the Belt and Road Initiative was launched in 2013, China's vocational education has actively responded to the needs of international production capacity cooperation and strengthened exchanges with countries around the world. A series of initiatives have been implemented: 36 Luban Workshops have been established in 30 countries, covering railway operation, new energy materials, and traditional Chinese medicine; "Chinese Language + Vocational Education" programs have been launched in over 40 countries, involving high-speed rail, trade, tourism, aviation, metallurgy, and petroleum (Zhou, 2025). Regionally, under mechanisms such as the Belt and Road Initiative and the China-ASEAN Free Trade Area, China and ASEAN have deepened vocational education cooperation focused on regional industrial needs, aiming to boost ASEAN's vocational education capacity through program alignment, joint talent cultivation, teacher exchange and training, co-building digital learning platforms, and establishing Luban Workshops. In Central Asia, cooperation has focused on energy, transportation, and agriculture through joint college building, characteristic projects, and resource sharing, cultivating localized technical talents while supporting industrial collaboration. Under the framework of the Forum on China-Africa Cooperation (FOCAC), China and African countries have systematically advanced vocational education cooperation and exchange, with commitments to establish additional Luban Workshops and encourage Chinese enterprises in Africa to provide no less than 800,000 local employment opportunities.

Second, under the new context of China's opening-up, there has emerged a new concept for vocational education: Going Global with Industries. As an innovative paradigm for the

internationalization of China's vocational education, its core essence lies in vocational education keeping pace with the global layout of China's advantageous industries and advancing "into the world" in synergy with enterprises, so as to provide precise talent support and technical services for industrial globalization. Derived from the clear deployment of the Ministry of Education to advance the reform of the vocational education system, this model breaks the single-output pattern of traditional education going global and forms a two-way cycle where "industries empower vocational education and vocational education supports industrial development". This model not only addresses the talent shortage faced by Chinese-funded enterprises in their overseas development, but also realizes the international output of China's vocational education standards, teaching materials, and teaching resources.

In the meantime, China firmly adheres to the policy of educational opening-up and makes solid progress in both "Bringing In" and "Going Global" initiatives. In its 2016 *Action Plan for Promoting Educational Cooperation* under the *Framework of the Belt and Road Initiative*, the Ministry of Education (2016) states that China will consistently uphold the opening up of the education sector and thoroughly integrate itself into the global trend of educational reform and development. Article 13 of the newly revised *Vocational Education Law of the People's Republic of China* issued in 2022 (Chen, 2022) mandates the encouragement of foreign exchange and cooperation in vocational education as well as supports the reciprocal validation of various forms of vocational learning outcomes.

As China's international cooperation in vocational education continues to deepen, the issues of lacking unified evaluation standards for vocational education learning outcomes and the difficulty in achieving their alignment, mutual recognition, and conversion have become increasingly prominent. The successes of these programs—particularly the growing demand for internationally comparable skills credentials—compelled Chinese TVET experts to seriously consider the necessity and possibility of global mutual recognition of TVET learning outcomes. Correspondingly, the importance of jointly establishing a mutual recognition mechanism for vocational qualifications and vocational skill levels through international cooperation has also become more pronounced.

In particular, the Ministry of Education and the government of Guangdong Province co-created a policy document in 2020 concerning the mutual recognition of TVET learning outcomes. The document identifies Shenzhen Polytechnic University as the lead in formulating and promoting the Shenzhen Accord on the global mutual recognition of vocational education (People's Government of Guangdong Province, 2021)—a development that marked the launch of the IMRVELO project. In November 2024, Ministers of Education from 32 countries released the Tianjin Consensus, which calls for all nations to jointly formulate quality standards that are adaptable to global sustainable development, widely recognized by all countries, and conducive to guiding outstanding evolution in vocational education (Ministry of Education, 2024). The consensus added that they will jointly initiate relevant agreements at the 2026 World Conference on the Development of Vocational and Technical Education to promote the substantial equivalence of vocational education quality standards among countries worldwide. The statement marked that the international mutual recognition of vocational education learning outcomes had officially become a major issue in international cooperation on vocational education.

IMRVELO PARTICULARS

The IMRVELO scheme, initiated in 2020 and promoted by the 2024 Tianjin Consensus, is designed as a set of common technical standards and platforms to facilitate substantial equivalence in learning outcomes. It is intentionally built on the "greatest common factor" approach, focusing on the level hierarchies shared by most countries to ensure rapid adoption.

International Vocational Education Levels (IVEL)

The IVEL proposed in this scheme references the International Standard Classification of Education (ISCED), the WRL, regional qualification frameworks such as the EQF, relevant NQFs, and the implementation details of typical vocational education systems. The IVEL contain four levels. As most countries and regions in the world have widely established vocational education at the secondary level, the IVEL framework uses secondary-level vocational education as a baseline. Defined by the skill/ability development degree, it sets out from the IVEL 1, and rising to Level 2, Level 3, and Level 4 (Table 1).

Instead of pursuing the establishment of a universally applicable international qualification framework, the scheme focuses on the vocational education level hierarchies shared by most countries—analogous to the "greatest common factor" in mathematics. It prioritizes in-school students and other young job seekers, aiming to enhance the convenience of its promotion and implementation across different countries.

Conceptually, the content of the IVEL is designed on three

Table 1: The content of IVEL

IVEL	Brief description
Level 4	Equivalent to ISCED Level 6 or degree apprenticeships
Level 3	Equivalent to ISCED Level 5 or higher-level apprenticeships
Level 2	Equivalent to ISCED Level 4 or apprenticeships
Level 1	Equivalent to secondary-level vocational education

IVEL, International Vocational Education Levels; ISCED, International Standard Classification of Education.

dimensions (Table 2). Specifically, the academic qualification dimension of the first level of IVEL stipulated that it is equivalent to vocational education at the secondary education level, mainly corresponding to Level 3 of the ISCED, and can be downwardly compatible with vocational education at Level 2 of ISCED. The skill dimension defines that it corresponds to Level A of the WRL. The description of WRL Level A corresponding to this IVEL level is "Level A: Covers the essential requirements of modern society, learning and work (functional literacy, numeracy, use of information and communication technology, general knowledge), extending to the competencies associated with basic learning and simple work roles". With respect to the learning types, it may include primary vocational education schools, secondary vocational education schools, vocational senior high schools, and comprehensive senior high schools that provide vocational education.

With respect to the IVEL 2, in terms of educational qualification, this level corresponds to the fourth level of ISCED system, which is post-secondary non-tertiary education. In the meantime, the level can be downwardly compatible with vocational school education at the upper secondary level. In terms of skill dimension, it corresponds to WRL Level B. The description of WRL Level B is as follows: "At the academic level, it ranges in academic terms from the kinds of outcomes typically set for the end of compulsory education to the kind of outcomes typically associated with entry to tertiary or higher education studies. In work terms, it ranges from the capabilities required to carry out relatively independent, but routine, work roles to skilled work and supervisory roles". With regard to educational types, it covers apprenticeships, enterprise-based vocational education, and technical education in the workplace, rather than predominantly in schools.

With respect to the IVEL 3, in terms of academic qualification, this level is equivalent to higher education at the junior college level (associate degree level), corresponding to Level 5 of the ISCED. In terms of skills, it corresponds to Level C of the WRL. The description of WRL Level C is as follows: "Level C is characterised by the capabilities associated with the first cycle of tertiary or higher education, or the work roles of para-professionals, junior professionals, specialists and managers". In terms of learning types, it includes higher-level apprenticeships, advanced technical education, and other vocational education delivered primarily at the workplace. It also covers specialized institutions and community colleges established in some countries that provide higher vocational education.

With respect to the IVEL 4, in terms of academic qualification, this level is equivalent to higher education at the bachelor's degree level, corresponding to Level 6 of the ISCED. It is upwardly compatible with professional degree education at ISCED Level 7. In terms of skills, it corresponds to Level D of the WRL. The description of WRL Level D is as follows: "Level D is characterised by advanced intellectual and occupational capabilities. It includes outcomes associated with the second and third cycles of higher education, and the activities and responsibilities of independent specialists, technologists, analysts, and executives with extensive and/or strategic responsibilities". In terms of learning types, it covers specialized institutions that offer undergraduate-level vocational education, such as vocational undergraduate universities in China and Senmonshoku Daigaku (Specialist Universities) in Japan. It also includes Universities of Applied Sciences, Polytechnic Institutes, and certain programs in comprehensive universities. Additionally, it encompasses degree apprenticeships and technician education programs in some countries—forms of vocational education primarily delivered at the workplace.

Taxonomy of objectives for international vocational education

As a system of theoretical indicators, the taxonomy of objectives is crucial for advancing the global mutual recognition of TVET learning outcomes due to its functions in specifying the eventual ends of education and guiding the process of reciprocal acknowledgment. In international vocational education, the taxonomy lays the foundation for the development of TVET standards, but it cannot be borrowed directly from existing taxonomy frameworks because these fail to capture the nature and characteristics of TVET. Nevertheless, valuable lessons can be learned for the construction of a new taxonomy from some widely used schemas, especially Bloom's Taxonomy of Educational Objectives (Anderson & Krathwohl, 2001), the Taxonomy of Objectives for Competency-Based Education (Thackaberry, 2017), the Taxonomy of Objectives for the Qualification Framework, and the Taxonomy of Objectives for WRL (Cedefop, 2019). These systems served as reference in the formulation of a new taxonomy of vocational education objectives under the IMRVELO.

Table 2: Description of IVEL

Item	Level 1	Level 2	Level 3	Level 4
Academic qualification	It is equivalent to vocational education at the secondary education level, mainly corresponding to Level 3 of ISCED, and can be downwardly compatible with vocational education at Level 2 of ISCED	It is equivalent to post-secondary non-tertiary education level, mainly corresponding to Level 4 of ISCED, and can be downwardly compatible with vocational school education at the upper secondary level	It is equivalent to higher education at the junior college level (associate degree level), corresponding to Level 5 of ISCED	It is equivalent to higher education at the bachelor's degree level, corresponding to Level 6 of ISCED. It is upwardly compatible with professional degree education at ISCED Level 7
Skill	It corresponds to Level A of the WRL. The description of WRL Level A corresponding to this IVEL level is "Level A: Covers the essential requirements of modern society, learning and work (functional literacy, numeracy, use of information and communication technology, general knowledge), extending to the competencies associated with basic learning and simple work roles"	It corresponds to Level B of the WRL. The description of WRL Level B is as follows: "At the academic level, it ranges in academic terms from the kinds of outcomes typically set for the end of compulsory education to the kind of outcomes typically associated with entry to tertiary or higher education studies. In work terms, it ranges from the capabilities required to carry out relatively independent, but routine, work roles to skilled work and supervisory roles"	It corresponds to Level C of the WRL. The description of WRL Level C is as follows: "Level C is characterised by the capabilities associated with the first cycle of tertiary or higher education, or the work roles of para-professionals, junior professionals, specialists and managers"	It corresponds to Level D of WRL. The description of WRL Level D is as follows: "Level D is characterised by advanced intellectual and occupational capabilities. It includes outcomes associated with the second and third cycles of higher education, and the activities and responsibilities of independent specialists, technologists, analysts, and executives with extensive and/or strategic responsibilities"
Learning types	It may include primary vocational education schools, secondary vocational education schools, vocational senior high schools, and comprehensive senior high schools that provide vocational education	It includes apprenticeships, enterprise-based vocational education, technical education, and other forms of vocational education delivered primarily at the workplace, rather than predominantly in schools	It includes higher-level apprenticeships, advanced technical education, and other vocational education delivered primarily at the workplace. It also covers specialized institutions and community colleges established in some countries that provide higher vocational education	It covers specialized institutions that offer undergraduate-level vocational education, such as vocational undergraduate universities in China and Senmonshoku Daigaku (Specialist Universities) in Japan. It also includes Universities of Applied Sciences, Polytechnic Institutes, and certain programs in comprehensive universities. Additionally, it encompasses degree apprenticeships and technician education programs in some countries—forms of vocational education primarily delivered at the workplace

IVEL, International Vocational Education Levels; ISCED, International Standard Classification of Education; WRL, World Reference Levels.

The IMRVELO taxonomy divides learning objectives into three broad domains, namely foundational, operational, and developmental competencies. Foundational competencies refer to the basic literacy, fundamental knowledge, and general skills required for learners to engage in specific vocational activities. This domain encompasses basic vocational literacy and professional competence, which can be subdivided into ethical and professional awareness, professional behavior, knowledge foundation, and skill application at the third level of the IMRVELO structure. Operational competencies pertain to the vocational-related abilities that learners must possess when completing the key work tasks specified by a job responsibility. This domain covers three second-level indicators, namely work preparation, work execution, and work adaptation. Finally, developmental competencies denote socioemotional and advanced cognitive abilities that learners need for career development and success. This dimension comprises three second-level indicators, namely personal, interpersonal, and innovative competencies. The structure of the IMRVELO taxonomy of objectives is presented in Table 3. Guided by such a taxonomy, TVET teachers can develop curriculum resources, organize teaching activities, and carry out educational assessments.

Classification of international vocational education standards

Developed from the IVEL system, the level descriptors, and the objectives taxonomy, the "international vocational education standard classification" refers to a set of normative terminologies regulating the statements of standards established in each work fields. Given the distribution of taxonomy indicators across three levels, there are corresponding statements detailing each indicator. Such statements are defined by the level descriptors, so they have commonalities in terms of dimension and changes in degree according to the IVEL system, with demands for higher abilities growing level by level.

Specifically, the rules underlying level 1 stipulate what values, knowledge, skills, and abilities an individual must be equipped with to complete routine tasks under guidance. The rules governing level 2 indicate what is needed for a person to complete common work tasks independently. Level 3 identifies the values, knowledge, skills, and abilities required for an individual to implement work tasks of greater difficulty and complexity independently. The rules of level 4 specify the requirements for undertaking responsibilities and realizing achievements as a team leader. By referring to the detailed coverage of the standard classifica-

Table 3: Taxonomy of objectives for international vocational education

First-level dimensions	Second-level dimensions	Third-level dimensions
Foundational competencies	Professional ethics and behavior	Ethical and professional awareness
		Professional behavior
	Professional knowledge and skills	Knowledge foundation
		Skill application
Operational competencies	Task preparation	Action-centered task
		Responsibility
		Working with others
		Quality and performance management
		Resource integration
	Task execution	Skill and procedure
		Communication
		Data-driven decision making
		Systematic review and optimization
	Task adaptation	Context understanding and adaptation
		Problem analysis and resolution
		Value-driven continuous improvement
Developmental competencies	Personal competencies	Self-learning
		Self-management
	Interpersonal competencies	Interpersonal communication
		Collaboration skills
		Leadership
	Innovative competencies	Innovative thinking
		Innovative practice
		Digital and intelligent application

tions, researchers and practitioners can develop a system of standards in a certain work field by integrating it with specific real-world demands.

Framework for international vocational education curricula

To construct course models for participating institutions and provide curriculum resources for individuals, we developed IMRVELO in a way that allows for the design of a curriculum framework, laying a solid foundation for the global mutual recognition of TVET learning outcomes. This framework defines the course types, course levels, course categories, the required number of curricula, recommended credits, and study hours that TVET institutions should implement. It can also help researchers and practitioners develop course resources and enact credit transfers.

The IMRVELO curriculum framework endorses two types of courses. The primary type, called the standard course, is that developed while strictly following the classification of international vocational education standards. Its level and credits conferred in a standard course are fixed, and the objectives, content, and evaluative criteria all reflect the requirements indicated in the classification standards. Such courses can be delivered directly for teaching and credit recognition by participating institutions, and they serve as models for accrediting courses developed through other frameworks.

The IMRVELO curriculum framework likewise regulates the number of courses offered, along with the credits awarded for completion and study hours, in accordance with the foundational, operational, and developmental competencies laid out earlier. Specifically, standard courses at IVEL 1 includes 10 foundational competence courses, 3 operational competence courses, and 4 developmental competence classes. Standard courses at IVEL 2 are 10, 4, and 4 foundational, operational, and developmental competence courses, respectively. There are 10 foundational competence courses, 5 operational competence courses, and 8 developmental competence courses offered at the third level, while 10, 6, and 8 such classes, respectively, are delivered at IVEL 4.

The objectives pursued in standard courses are stipulated in the IMRVELO proposal. Foundational competence courses are aimed at developing the basic literacy, fundamental knowledge, and general skills required to engage in specific vocational activities. Classes focusing on operational competence are intended to develop learners' competence in performing practical job tasks. Developmental competence courses focus on cultivating learners' socioemotional and higher-order cognitive abilities, helping them achieve

personal career development, continuously improve their abilities, and play an active role in teams in specific vocational fields. Since operational competence courses are designed to equip learners with the skills demanded by a given position, institutions are advised to endow three credits to each course, in contrast to the single credit that can be acquired each under foundational and developmental competence classes.

The second type of course endorsed in the framework is the accredited course, which is derived from other sources but recognized and accredited by the IMRVELO project. These are mainly developed by and implemented in participating institutions that commit to adhering to the IMRVELO proposal. Accredited courses are included in the international vocational education course catalog for management after being assessed as substantively equivalent in accordance with the classification of international vocational education standards. Recognition under an accredited course is governed by the principle of substantive equivalence, which means that the learning objectives, demands, and difficulties of the course are equivalent to that of its standard course counterpart. Nevertheless, there are many changes in curriculum content, learning material, and teaching method in the latter, to name a few. Accredited courses receive accreditation on the basis of category; thus, foundational, operational, and developmental competency courses cannot be recognized as other types of courses. That is, cross-category accreditation is prohibited.

The specific substitution rules specified in this scheme are as follows: If the course objectives and content level of a course offered by a cooperative institution are consistent with those of a "Professional Competence" standard course, it can substitute the standard course and be awarded corresponding credits in accordance with the principle of substantive equivalence. The maximum substitution volume is 8 courses (16 credits).

If a corporate technical and skill-based training course is consistent with an operational competency courses, it can substitute the standard course and be awarded corresponding credits in accordance with the principle of substantive equivalence. The maximum substitution volume varies by level: 9 credits for operational competency Level 1 courses, 12 credits for Level 2, 15 credits for Level 3, and 18 credits for Level 4.

Additionally, this scheme stipulates that the maximum substitutable credits of Accredited Courses from cooperative institutions or enterprises shall not exceed 50% of the total credits. This arrangement not only reflects the flexibility of international mutual recognition of vocational education learning outcomes but also effectively ensures the quality of mutually recognized outcomes.

International vocational education learning outcomes

International vocational education learning outcomes refer to the various measurable and cumulative learning achievements that a learner makes within the IMRVELO framework. They encompass credits earned by completing IMRVELO standard courses and other types of outcomes that have been uniformly standardized and recognized by this program. The latter ones should be traceable, such as academic degree certificates, corporate training certificates, vocational or skill certificates, and achievements from vocational skills competitions. These recognized achievements can be awarded credits following the rules on credit recognition and transfer. Through credit recognition, transfer, and accumulation, a qualified learner can be awarded an IVEL certificate.

To facilitate the recognition of TVET learning outcomes, some regulative principles must be followed. For instance, the recognition of learning outcomes should adhere to the fundamental principles of unified standards; quality-oriented, transparent processes; and traceable evidence. To this end, learning outcomes should have the following key characteristics: First, outcomes must be measurable. In other words, a quantitative or qualitative assessment should be performed to determine whether a course, a certificate, or an award can satisfy the demands stipulated in the IMRVELO proposal. Second, learning outcomes should be sustainable, which requires providers to hold skills competition programs periodically and continually as well as offer courses constantly. Third, outcomes should be characterized by openness instead of exclusivity for a minority or privileged group. Finally, it should be public welfare. Public welfare refers to public welfare programs that do not aim for profit. Any learning outcome obtained through purchase is excluded from the recognition catalog.

By accumulating required credits, a learner can be awarded certificates or diplomas designed by the IMRVELO team. This scheme offers four IVEL certificates, which are awarded to learners who have completed level 1, 2, 3, and 4 courses. The scheme also provides two types of diplomas for international higher vocational education, namely associate and bachelor's diplomas. The international vocational education diploma is a composite proof of learning achievements that combines the IVEL certificate and the academic certificates issued by TVET colleges and universities. With IMRVELO's certificates and/or diplomas, an individual can illustrate his/her abilities more easily in the labor market, even in a foreign context.

Work fields of international vocational education

To advance the implementation of the IMRVELO proposal, a necessary task was to build a framework for international cooperation in vocational education. Grounded in industry classification schemes such as the *International Standard Industrial Classification of All Economic Activities* (United Nations, 2008) and the *Global Industry Classification Standard* (MSCI, 2023), the IMRVELO scheme has design the work field as a constructive unit for standard development, curriculum resources development, and credit recognition. TVET researchers outline a work field on the basis of job position setting in the labor market, and a work field covers a cluster of positions linked to each other and the sharing of certain skills. Focusing on the key areas of the "Belt and Road Initiative", Chinese experts and practitioners have developed the first batch of work fields for catalog construction, but more such fields are needed for the objectives of the IMRVELO project to be achieved.

The work field catalog adopts the three-tier structure of industry category-industry subcategory-work field. The first batch of work fields covers 9 industry categories, 27 industry subcategories, and 34 work fields, each involving in-depth cooperation between Chinese enterprises and vocational colleges to ensure the implementation and promotion of the scheme. As the catalog currently encompasses a small part of the TVET sector, it is necessary to remain open and conduct updates regularly.

CONCLUSION

The core purpose of launching the IMRVELO project, which is based on common technical standards and platforms, is to enhance the quality, adaptability, and equity of vocational education globally. It is aimed at expanding international learning pathways for the youth in the era of globalization and digitalization as well as increasing the employment opportunities available to them in international enterprises. The formulation and implementation of the IMRVELO project present positive implications for accelerating cooperation consensus, creating a truly global talent pipeline and contributing significantly to the UN 2030 Agenda for Sustainable Development (UN General Assembly, 2015).

IMRVELO is a timely and pragmatic response to the globalization and digitalization of work. By employing a "greatest common factor" design (IVEL) and a detailed, WRL-aligned competency taxonomy, the scheme overcomes the structural limitations faced by antecedent frameworks like the EQF and the unreleased WRL. The core purpose of the IMRVELO is to expand international learning pathways for young people, thereby enhancing the quality, adaptability, and equity of VET.

Based on the principles of joint discussion, joint construction, joint governance, and shared benefits, the successful implementation of this scheme relies on continued collaboration between educational institutions and cooperative enterprises globally. The establishment of this common technical platform and set of standards is an essential step towards accelerating cooperation consensus and creating a truly global talent pipeline, contributing significantly to the UN 2030 Agenda for Sustainable Development.

Future research on the IMRVELO framework should move beyond conceptual discussion and place stronger emphasis on empirical validation in concrete industrial contexts. In particular, in-depth case studies on the application of IMRVELO in emerging sectors such as new energy vehicles and the digital economy would help uncover industry-specific governance arrangements, cooperation mechanisms, and skill formation pathways. These sectors are widely acknowledged as profoundly shaped by digital transformation and green transition, which have fundamentally reshaped skill demand structures and training models worldwide (Li & Zheng, 2025; OECD, 2025).

Another important direction for future research is to investigate the acceptance and adoption of the IMRVELO framework among participating countries and institutions. Drawing on theories of innovation diffusion and technology acceptance, empirical studies could explore how perceived usefulness, institutional compatibility, policy alignment, and stakeholder incentives influence engagement with the framework (Davis, 1989). In addition, future studies should focus on the technical development and long-term sustainability of the IMRVELO project itself. International experience has suggested that the effectiveness of cross-border vocational education platforms depends not only on policy design but also on digital infrastructures, governance mechanisms, and continuous stakeholder participation (OECD, 2025). Addressing these dimensions will be crucial to ensuring the sustainable expansion and global relevance of IMRVELO.

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