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A Comparative Study of Master's Courses in Technical and Vocational Education in Selected Universities of Australia, Germany, Malaysia and United States of America

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ABSTRACT

This is a comparative study of Master's courses in Technical and Vocational Education (TVE) in selected universities of Australia, Germany, Malaysia and United States of America. This is a comparative-qualitative research using documentary method for data collection and regional approach of George Bereday for analysis and presentation of the results. The level of analysis and unit of observation of the research was "Macro" (country) and the sample selection strategy was "different social systems, similar educational outcomes". The findings indicate the similarity in the three subjects of "teaching principles", "curriculum" and "philosophy of teaching" in the selected universities. For example, Tun Hussein Onn University of Malaysia and Technical University of Munich in Germany have similarities in assigning the courses of "TVE Management" and University of Wisconsin–Stout in the United States of America and Technical University of Munich in "Management of Resources ".Also findings revealed the difference in the title and number of courses related to technology, evaluation, management in TVE, problems and challenges of TVE, adult education, research in TVE, internship, seminar & thesis, psychology & counseling. According to the findings, it is suggested to the planners of TVE in Iran to include the following subjects in the master's course: Principles of teaching, philosophy, evaluation and management of TVE, curriculum, issues and challenges of TVE, adult education, research in TVE, and internship, seminar & thesis in TVE, and psychology & counseling.

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1. Introduction

Technical and Vocational Education (TVE) has been increasingly considered as one of the pillars of the educational system and is of central importance for the transfer of skilled learners from school to the labor market (Spöttl & Stolte, 2022, Wagiran, Pardjono, Suyanto & Sofyan, 2017). The main goal of TVE in the 21st century is sustainable development with an emphasis on development of life skills, job skills and learning skills (Oviawe, Uwameiye, & Uddin, 2017; Hyland, 2014). TVE has gained its position as the driving force of sustainable development in different societies and is in the strategic and operational priorities of organizations such as the Organization for Economic Cooperation & Development (OECD), International Labor Organization (ILO), UNESCO, Association of Southeast Asian Nations (ASEAN) and Southeast Asian Ministers of Education Organization (SEAMEO) (Paryono, 2017).

Teachers, as the key element of any educational system (Chinedu, Wan-Mohamed& Ogbonnia, 2018), need to be promoted (Fernández-Batanero, Montenegro-Rueda, Fernandez-Cerero, & Garcia-Martinez, 2022; Majumdar, 2011) and to be able to respond to the changes & developments of science & technology (Rojewski, & Hill 2014; Salleh, & Puteh, (2017). In other words, the transformation in TVE depends on the training of teachers (Paryono, 2017). Development of professional competence should be provided through innovative teaching and learning and includes such things as investing in effective drivers of change - such as continuing education for teachers of technical & vocational education, teacher training courses, and skill enhancement & professional development (Billett, 2009; Subrahmanyam,2020). If we consider the TVE in the year of establishment of Dar al-Funun (1851), nearly 172 years of its life have passed in Iran. If the beginning of TVE coincides with the establishment of the first "Industrial Academy" (1924), these trainings have a history of a century in Iran (Marjani, 1994; Khalaghi, 2018). In 1960, the first technical and professional teacher training center at the post-diploma level named “House of Preliminary Art " started working in Tehran with the approval of the Supreme Council of Education (2019). In 1961, a center for training teachers of TVE schools for girls was established. With the increase in the number of centers, these institutions were renamed to "Technical & Vocational Teacher Training Center" and until 1979 were active in the fields of construction, auto-mechanics, electricity, vocational & technical, and administrative & commercial services. In addition to the activity of these centers and following the increase of technical & vocational schools, the Ministry of Education decided to train teachers of TVE at the undergraduate level (Marjani, 1994). For this purpose, in 1974 "Higher Institute of Technical & Vocational Education” and in 1975 "Arsham of Kerman Higher Institute of TVE" began to operate for a three-year undergraduate

course. In addition, in 1974, with the approval of the Ministry of Science & Higher Education, "Tehran Boys' Teacher Training Center" (House of Behbahani Art) accepted students in the fields of electricity, automobile industry and machine tools.

After the victory of the Islamic Revolution in 1979, the administrative affairs of these centers were concentrated in the "Office of Higher Technical and Vocational Schools" of the Ministry of Education. Simultaneously with the Cultural Revolution in April 1981, higher education centers, technology institutes and TVE teacher training centers stopped their activities. From 1981, with the permission of the Supreme Council of Cultural Revolution, these centers were reopened at the post-diploma (associate) level (Aghamsheh, 1987). In the first phase, in November 1981, six centers - in seven fields of auto-mechanics, electricity, building electro-technics, mechanics, professions & services - started operating with 815 students in the cities of Tehran, Isfahan, Shiraz, Mashhad and Yazd. In the next stage, in 2013, the “Institutes of Technology” also started to operate. At this stage, in the provinces that had several centers (Technology Institutes), these centers were merged and started working as technical and professional education complexes. Since 1985, all technical-vocational centers of the Ministry of Education at the higher than diploma level have changed their name to "Technical Training College" (Khalaghi & Navidi, 2018). “Shahid Rajaee Teacher Training University ", which before 1997 under the title of "Islamic Revolution Higher Technical Education Center" trained technical teachers at the associate and bachelor level, was established with the mission of training manpower needed for TVE centers (Bani Amarian, Javadipour, Hakimzadeh, Durrani, Khodaee, & Mobaraki, 2018). Currently, this university is the only university affiliated to the Ministry of Education, which is responsible for training technical and vocational teachers at the bachelor's level. This university equips students with specialized and pedagogical knowledge and skills and prepares them as professional teachers (Shahid Rajaee Teacher Training University, 2023).

In Iran, compared to the developed and developing countries, not much attention has been paid to the training of technical and vocational teachers at the post-graduate levels. Of course, this action has been taken in other educational levels such as elementary and secondary education (Farhangian University, 2023). Currently, in addition to the lack of technical and vocational training courses at the graduate level - master and doctorate - there are other shortcomings such as the lack of a suitable professional development path for technical & vocational teachers; lack of indigenous model of TVE curriculum; lack of a suitable program for the training of researchers and specialists in the field of technical & vocational education. These shortcomings have caused damage to Iran's TVE system and reduced its quality (Didehvar, 2021).

Here, it is necessary to examine the research background in different countries and Iran. More than 25 countries of the world at the Hangzhou China conference, which was held with the aim of investigating ways to improve the professional competence of TVE teachers, specifically emphasized the idea of establishing a "Master course in technical & vocational education" which was welcomed by many developing countries (Bünning& Jenewein, 2006؛Gerds & Zhao ,2006) in the research " Modular TVET-Teacher-Training-System, Based on Teacher-Qualification-Standards– a Proposal of UNIP ", classified technical and & vocational teachers into four levels of qualified, specialist, expert and mentor-teacher and according to these levels and level of educational degree have been defined their competencies and duties. According to International Labour Organization (ILO–UNESCO, 2009) training of technical & vocational teachers and trainers in developed countries has been developed to the level of master courses, while developing countries are planning for it . Grosch (2017), in an article entitled “Developing a competency standard for TVET teacher education in ASEAN countries ", concluded that the establishment of a master course in TVE can improve the qualifications of these teachers. Xue (2020), in a research entitled “Research on the Training Objectives of Professional Degree Postgraduates of Full-time Master of Education " considers the establishment of the Master's course in TVE as an effective measure to improve the quality of professional teachers' education. Spöttl & Stolte (2022) have analyzed the reason for the importance of university education and its effect on teachers' performance in the research entitled "Master's course in TVE and training in Germany". They are of the opinion that TVE teachers should have the ability to integrate the needs of the industry, private sector and government sector. Bünning and Schmidt (2022), in the research " International Framework for a Master’s Degree for the Professionalization of VET Teachers: Potentials for International Development Cooperation " have described basic elements of curriculum framework of the master's degree for technical & vocational teachers at the international level.

In a research related to TVE in Finland, Tapani & Salonen (2019) found that most of the student-teachers of TVE have a master's degree and at least three years of work experience. According to European Centre for the Development of Vocational Training (CEDEFOP) report (2020), some countries have set professional standards for TVE teachers. For example, the Czech Republic, Estonia, Ireland, Latvia, Lithuania, the Netherlands, Romania, Slovakia, Great Britain, Lithuania, Slovenia, and Finland are among those that have defined specific requirements in the curricula of professional education and the minimum qualifications for technical & vocational teachers are considered Bachelor and Master degrees.

In Iran, Mohammad Ali (2011) in an article "TVE and Ways to Improve It", while referring to the development of the field of TVE at the level of graduate education in countries such as Australia, USA, Germany and Malaysia, acknowledges that no academic field has been established in Iran's universities as a specialty in the field of technical & vocational education. He considers this lack as a reason for the unknown quality needs of market workers, lack of national occupational & professional standards, lack of a quality assurance and control system in technical & vocational education, and not keeping up with technological changes and need to upgrade these trainings at the level of Master and doctorate courses. Ronaghi Tasdighi (2011) in comparative study of "appropriate indicators for selecting school principals in primary, middle and high school levels in Iran, Germany and Japan" has stated that a teacher in Germany must have at least 23 years of education in order to qualify as a teacher having a master or doctorate degree . Khalaghi (2018) in his research "why TVE is ineffective in Iran: reasons and solutions", found that the establishment of courses related to the field of TVE in universities and the training of experts and researchers in this field at the Master and doctorate level as necessity and one of the important infrastructures should be considered by the educational planners . Didehvar (2021) in the article "Investigation necessity of creating a TVE and training field in the master level" emphasizes that the design and creation of a Master course in TVE and training is one of the essential needs of the educational system. The purpose of this research was to examine the topics and general titles of TVE courses in the master's course in selected universities in the United States of America, Germany, Australia and Malaysia from a comparative perspective .The research questions are:

- What are the similarities between titles of the master's courses in the field of TVE in the studied universities?
- What are the differences between the titles of the master's courses in the field of TVE in the studied universities?

2. Research Method

The research approach is qualitative using comparative method. The selected universities were universities of Wisconsin-Stout, Purdue and Central Florida in the United States of America, Technical University of Munich in Germany, Monash University in Australia and Tun Hussein Onn University of Malaysia. These universities were selected based on the strategy of "Different social systems, similar educational outputs" and the level of analysis and unit of observation was "macro"(Madandar & Kakia, 2018). The data was obtained from the universities homepages and

available documents. Among the 41 selected sources, in the first stage, 37 and then 34 sources were examined and analyzed. In order to analyze the data, two methods of agreement & difference of John Stuart Mill and the regional approach of Bereday (1964) were used. This model includes four steps of description, interpretation, juxtaposition and comparison.

3. Findings

First Step: Description

Based on Bereday's approach, at this stage, the general situation of the selected universities and the structure of their curriculum are described separately**.**

A: United States of America

1. Purdue University

Purdue University of the United States of America was founded in 1869 and has more than 400 research laboratories and 100 specialized centers and institutes. This university includes 13 faculties such as Faculty of Education (Purdue University College of Education, 2023) and offers about 270 majors in different degrees (Purdue University, 2023). Purdue University is ranked 99th in 2024 by QS World Ranking.

Curriculum structure

The Master's course in Technical and Vocational Education has been established with the aim of empowering adults to develop their career path. This curriculum is useful for professionals in various fields related to technical and vocational education, such as guidance & counseling, special education, academic content areas, adult education, training & development, human resource development & management. The content of the curriculum of this field includes basic courses (3 courses), curriculum & instruction (6 courses), management & policy (5 courses), disciplined inquiry (7 courses) and more courses applicable to obtain CTE licenses (5 courses) (Purdue University, 2023).

2. University of Central Florida

The University of Central Florida is a research university in Orlando, Florida. This university was established in 1963 with the mission of supporting the growing space program of the United States at the Kennedy Space Center (Gannon, 2023). This university is one of the largest universities

in the United States, with more than 68,000 students in more than 220 fields and courses. University of Central Florida has 13 colleges (University of Central Florida, 2023). In the TIMES world ranking in 2023, this university was ranked 401-500.

Curriculum structure

The field of technical and vocational education is offered in the master's course of this university in the faculty of "Educational Sciences & Innovation" and in "Department of Educational Leadership & Higher Education ". The purpose of this course is to train managers, coordinators, curriculum specialists, faculty members of technical & vocational education programs and workforce in various fields located in the following institutions: Secondary schools and technical centers, state colleges & universities, vocational rehabilitation colleges, companies & Military industry and professional associations and Organizations (University of Central Florida, 2023). The technical and vocational education master's curriculum requires a minimum of (39 credits) more than the bachelor's degree, including (18 credits) technical and vocational education core courses (18 credits) with a focus on specialization in one field. This course also requires completing an internship (3 credits), a research report (3 credits) and passing a comprehensive exam. By completing six courses (18 credits) in a specific field, the student is recognized as an expert in technical & vocational education in a specific field. Internship or gaining experience in a valid field takes place in person or online, where students must implement the knowledge and skills acquired in this curriculum in a practical way. The internship takes place under the supervision of a supervisor who is a faculty member of the university. Students may choose the seminar course instead of the internship course, which will be the basis of their continuing education in the doctoral course. Compulsory courses include 18 credits and it must be passed from elective and specialized courses. This academic course includes core courses, elective courses (including elective courses from the basics of education), and research & internship report (University of Central Florida, 2023).

3. University of Wisconsin-Stout

The University of Wisconsin-Stout was founded in 1891 by James Huff-Stott (1848-1911). This university is located in Menomonie, Wisconsin and has 13 colleges and 220 majors in different study courses. The University of Wisconsin-Stout has 9,600 students and a high graduate employability rate (97.4%). The university's research topics cover a wide range of disciplines such as business, education, engineering, psychology and social sciences. The university is strong in its interaction with industrial companies, which provides many opportunities for internships,

collaboration and learning, and is ranked 600 among colleges in the United States (University of Wisconsin-Stout, 2023).

Curriculum structure

The curriculum of technical and vocational education at the University of Wisconsin-Stout includes core and elective units that are held online. It is also possible to complete this course in two years full-time. This program includes 30 credits and provides a four certificate levels of professional competence in the specialties which are 1- technical & vocational education coordinator, 2- educational design, 3- adult education and 4- technical & vocational education leadership**.** The curriculum is subjects such as preparation for research (6-10 credits) including the basics of research, technical & vocational education issues, and thesis. In order to receive a certificate for a course suitable for teaching in technical & vocational education, it is necessary for the student to pass 30 credits, which includes the following units: Concepts of technical & vocational education (2 credits), topics in technical & vocational education (2 credits), Advanced Psychology of Learning for Education (2 credits), Future Technology (3 credits), Introduction to Research in Career & Technical Education (1 credit) and 10-14 electives. This curriculum is flexible and adjusted according to career goals. In addition, the goals include focusing on the development of leadership skills, learning design and coordination in the curriculum (University of Wisconsin-Stout, 2023).

B: Germany

1. Technical University of Munich

Technical University of Munich is one of the most prestigious and leading research universities in Germany and Europe. The university was founded in 1868 by King Ludwig II in Bavaria and now has campuses in Garching, Freising, Heilbronn, Straubing, and Singapore. The Technical University of Munich was ranked 30th in the world in TIMES ranking in 2023 (Times Higher Education, 2023). The Faculty of Educational Sciences of the Technical University of Munich was established in 2009. Its mission is to improve the level of professional qualification of educational staff of technical & vocational schools. Also, this university is recognized as the best university in the world in the field of industry and innovation. Among the disciplines of the Faculty of Educational Sciences are the disciplines of teaching in professional schools, integrated professional education for engineers, research on teaching & learning in English (Technical University of Munich, 2023).

Curriculum structure

The vocational education and innovation course is offered to those who wish to teach in vocational schools. Graduates can also be employed in vocational schools, technical colleges, academies or similar institutions. Both bachelor's and master's courses are organized in a specialized subject. One of the features of the curriculum is that it is designed for a wide range of specialists, such as those who intend to pursue management jobs related to technical and professional education, for example, working in ministries, companies and associations or in educational centers and institutions - such as technical and professional schools and universities (Technical University of Munich, 2023). Having at least one year of work experience, a bachelor's degree related to technical & vocational education and completing 6 academic semesters (five semesters plus a master's thesis) are among the requirements for obtaining a degree in this course. This curriculum includes nine main modules (52 European Credit Transfer and Accumulation System (ECTS) which are presented in the first three semesters of this course: A specialized module (8 credits) as part of the fourth semester and a master's thesis (30 credits) in the fourth and fifth semesters (Technical University of Munich, 2023).

C: *Malaysia*

Tun Hussein Onn University of Malaysia

Tun Hussain University of Malaysia is a public university established in 2000. This university is named after Hussein Onn, the third Prime Minister of Malaysia. This university is located in Batu Pahat, Johor and has different campuses in the fields of natural sciences, engineering, agriculture, medicine, economics and social sciences. This university is also a part of the network of technical universities in Malaysia, which aims to promote and develop technical & vocational education in the country. Tun Hussein Onn University of Malaysia is one of the largest universities in Malaysia with an annual budget of nearly 7 million euros and 41,000 students. This university is also among the most prestigious universities in the world and is recognized as the best university in the world in the field of industry and innovation (Tun Hussein Onn University of Malaysia, 2023). Based on the TIMES ranking in 2024, this university is ranked 1500-1201 in the world.

Curriculum structure

The purpose of this educational course is to train teachers with high skills based on the theories and practices related to technical & vocational education (Tun Hussein Onn University of Malaysia, 2023). The curriculum includes 17 lessons in the field of pedagogy, evaluation, technical &

vocational education curriculum design and research methods. Full-time program assigned to this course is at least three semesters (1.5 years) and part-time at most six semesters (3 years). This program has six educational goals that include educational aspects, analysis, planning, communication, leadership, participation, diversification and development of skills and knowledge (Tun Hussein Onn University of Malaysia, 2023).

D: *Australia*

1. Monash University

Monash University is one of the best universities in Australia and the world, located in Melbourne. This university was established in 1958 and it got its name from Sir John Monash, one of the heroes of the First World War. Monash University has 10 faculties that offer undergraduate and graduate courses in various fields such as engineering, medicine, science, art, business, law and education. This university also has six campuses in Australia and five international campuses in Malaysia, China, India, Italy and South Africa (Monash University, 2023). Monash University is ranked 42nd among the universities of the world.

Curriculum structure

The MA degree in "Adult & Professional Education and Training" at Monash University is designed to meet the needs of teachers in diverse and emerging learning environments. The goals of this course are**:**

- Professional practice related to adult education & learning
- Compilation & evolution of the curriculum
- Policy
- Language & literacy studies
- Research in the field of adult learning

Forty eight credit points are considered for obtaining a degree in this course, which includes four main fields (24 credit points) and four optional fields (24 credit points). The main units are learning and career development, vocational education & training, learning integrated with work and theory & practice of career development. Elective units can be chosen from subjects such as leadership, policy making, curriculum, evaluation, research methods, etc. This academic course can be completed in 1.5 years full-time or 3 years part-time (Monash University, 2023).

Second Step) Interpretation

At this stage, the titles of the technical & vocational education courses of the selected universities, whose curriculum structure was presented in the previous stage, are examined separately**.**

A: *United States of America*

1. Purdue University

The field of technical & vocational education is implemented in the master's course in the Faculty of Education of Purdue University. The curriculum of this course includes various subjects in different fields related to the professional qualifications of teachers at higher levels. The courses implemented in this university are: Principles & philosophy in technical & vocational education; organization & coordination of technical & vocational education; contemporary issues in technical & vocational education; teaching generalized skills in technical & vocational education; curriculum in technical & vocational education; field experience in business & industry; legal issues in technical & vocational education; supervision in technical & vocational education; research in technical & vocational education; evaluation in technical & vocational education; program evaluation in technical & vocational education; professional training techniques; technical & vocational education for learners with special needs (Purdue University, 2023).

2. University of Central Florida

The field of technical & vocational education is offered at the master's level in faculty of "Education & Innovation", University of Central Florida and under the "Department of Educational Management & Higher Education". This educational course is suitable for teachers of technical & vocational secondary schools and technical centers (University of Central Florida, 2023). Among the main courses are: Student guidance in the career-workforce program; History of vocational education in the United States; issues related to job training; research in vocational training; school & job preparation; Planning & implementation of vocational training curriculum. Also, optional courses include: Seminar in business education; management of job training programs; management of local job training programs; Experiential learning in job and workforce training programs; Supervision of local technical & vocational training programs and school & society relations for technical & vocational training programs. If students are interested in working with secondary school students in traditional educational institutions, they can take courses adult education, human development & lifelong learning; statistics for educational information;

measurement & evaluation in education; basics of research in education and multicultural education. This educational course is for the training of human resources needed by secondary schools and technical centers, government schools & universities; vocational rehabilitation schools; companies; designed professional associations & organizations (University of Central Florida, 2023).

3. University of Wisconsin-Stout

The University of Wisconsin-Stout offers a Master of Science in Technical & Vocational Education curriculum for professionals who are responsible for the preparation and training of youth or adults. The lessons of this course include: Challenges in Technical & Vocational Education; Professional principles and technical education; Advanced Psychology of Learning for Education; An introduction to research in Technical & Vocational Education; marketing & business training; Principles of Technical & Vocational Education; Marketing and business education issues; coordination of work-based learning programs; issues related to Technical & Vocational Education; Development of curriculum and training; career development; Technical & Vocational Education coordinator; Planning & Resource Management; policy and legal issues in education; Education management & leadership; future of technology; Seminar in Technical & Vocational Education; and career education internship and career paths (University of Wisconsin-Stout, 2023). The targeting and content of the curriculum, which contains management and technology themes along with pedagogy courses, shows that this university, in addition to training secondary school students pays attention to the training of technical students in the higher education system.

B) Malaysia

1. *Tun Hussein Onn University*

Master's course in Technical & Vocational Education is offered at the Technical and Professional College of Malaysia. The titles of the courses are as follow: Data analysis & reasoning for education; research & development method in Technical & Vocational Education; Qualitative research in education; leadership & management in Technical & Vocational Education; Curriculum design in Technical & Vocational Education; Educational philosophy in Technical & Vocational Education; Educational psychology in Technical & Vocational Education; Pedagogy in Technical & Vocational Education; micro-education in Technical & Vocational Education; assessment & evaluation in Technical & Vocational Education; Educational sociology in Technical & Vocational Education; Educational technology in Technical & Vocational Education; Information technology

and the use of multimedia; curriculum management; Master's project 1; Master's degree project 2 and teaching practice (Tun Hussein Onn University, 2023).

C) Germany

1. Technical University of Munich

The Master's course in Technical & Vocational Education is offered in this university for those who want to teach in technical and professional institutions. There is also the possibility of employment for graduates of this field in technical and professional schools, technical schools, and educational institutions. The courses offered in the form of core and elective subjects in this university include the following: Professional principles & technical education; Psychology of education; marketing training; Principles of Technical & Vocational Education; Research in Technical & Vocational Education; work-based learning; challenges of Technical & Vocational Education; Curriculum development and training; resource management; policy and legal issues in education; management of Technical & Vocational Education; technology and education; seminar in Technical & Vocational Education and internship. Restrictions in the subjects in order to limit the students are one of the features of the curriculum in this university (Technical University of Munich, 2023).

D) Australia

1. Monash University

The field of adult education and technical training at the master's level is one of the social science courses that are held in the "Faculty of Educational Sciences & Human Development" of Monash University located in Melbourne, Australia. This course is designed for two years full-time or four years part-time and gives students the necessary skills to design, implement, evaluate and develop Technical & Vocational Education programs. This educational course is suitable for teachers of Technical & Vocational Education secondary schools and technical centers. The main courses of this course are: Learning & curriculum for adults in the workplace; Vocational education and training policies and methods; Literacy in the field of adults; society and cultural difference; literacy & technology; Communicative language training; Teaching languages for specific purposes; curriculum management; Management of employees in educational organizations; Human resources development; lifelong learning; Schools for tomorrow; improving the quality of education; Economy, politics and workplace relations; society, adults & further education; financial & economic affairs, industrial relations policy in education, change in Australian education, history

of public policy in Australian education, teachers/trainers, workplace and workplace change; Globalization & education policy; Higher education in Australia, England and USA; gender & education; difference, equality & education; issues of gender, ethnicity & class; Curriculums for work-related learning, philosophical issues in curriculum development. The prediction of various subjects with an emphasis on core competencies shows the attention of the curriculum planner to the courses (Monash University, 2023).

Third Step) Juxtaposition

According to the data of description and interpretation stages, the research evidence is classified in this stage to pave the way to compare the similarities and differences in the subject under investigation. This stage includes the findings of the examination of the characteristics of the curriculum structure and the titles of the Technical & Vocational Education courses in the master's degree**.** Monash, Central Florida and Wisconsin State universities have included core and elective courses in the content of their curriculum. The University of Central Florida has made 39 credit points as specialized courses and 18 credit points for elective courses plus three units of internship - or research report - and success in the comprehensive exam as a condition for acceptance in this academic course (University of Central Florida, 2023). Monash University has designed 48 units (including 24 specialized units and 24 elective units related to four fields) for this course (Monash University, 2023). University of Wisconsin-Stout includes 30 credits - including 6-10 credits of preparation in research and 10 credits of specialized courses and 10-14 credits of elective courses - in the curriculum of this field (University of Wisconsin-Stout, 2023). The Munich University program has nine main modules which are equal to 52 credits - including five academic semesters and one thesis semester- (Technical University of Munich, 2023). Purdue University has a total of 14 courses - including basic courses (three unit), courses related to the curriculum (six units) and management and politics (five units) for this course (Purdue University, 2023). Tun Hussein Onn University of Malaysia planned 17 course titles - which includes most specialized courses - for five academic semesters.

The period of this course is two full-time years at Monash University, three years at Munich University, and 1.5 to 3 years at Tun Hossein University. In the curriculum of Purdue University, attention has been paid to subjects such as evaluation courses, topics and issues in Technical & Vocational Education. Also, courses such as Technical & Vocational Education for learners with special needs, legal issues in Technical & Vocational Education, and generalized skills in Technical & Vocational Education are among the curriculum of this university. In addition, the seminar, thesis

and internship and the prediction of the comprehensive exam to obtain the degree of this course are among the relevant indicators of this university (Purdue University, 2023). The University of Central Florida is considered in such a way that the students acquire the necessary skills appropriate for employment in different job environments related to Technical & Vocational Education (Vaughan, 2007). Internship and seminar are also part of the courses of this field. Investigating the history of career and technical education in the United States and multicultural education is one of the special courses of this university (University of Central Florida, 2023). At the University of Wisconsin-Stout, courses are designed with the aim of preparing teachers and trainers of technical and professional education. In this university, attention has been paid to subjects related to training, principles & philosophy, curriculum, research, and management of Technical & Vocational Education. Due to the multitude of courses related to management and leadership and career development, the importance of these courses in Technical & Vocational Education can be realized. In this university - like other selected universities of United States - the titles of internship and seminar are included in the courses of the field (University of Wisconsin-Stout, 2023).

In Tun Hussein Onn University, the course titles of this field include things such as research methods, management, curriculum, evaluation, technology and management in Technical & Vocational Education. In addition to the project unit - which is intended for the final two semesters - the courses related to pedagogy, psychology, sociology, information technology and educational technology can also be seen in the table of Technical & Vocational Education of the master's course of this university (Tun Hussein Onn University, 2023). Technical University of Munich has also included courses related to education, research, curriculum, management, technology and issues of Technical & Vocational Education, as well as policy and legal issues of Technical & Vocational Education with the aim of promoting trainers and teachers. In addition, students are required to complete a seminar and internship to obtain a degree from the University of Munich. Special attention was paid to the curriculum and adult education in the course titles of Monash University in Australia, and a high variety of courses from the psychology, management and pedagogy spectrum is considered (Technical University of Munich, 2023).

In order to create a more suitable background and get a precise understanding of the data and to carry out the process of comparing the similarities and differences in the next step, the researchers decided to cluster the courses under the general headings. With the explanation that the course titles available in the study programs of the studied universities - based on the nature of the subject - have been organized in one of the course clusters of technology, evaluation, teaching

principles, psychology & counseling, philosophy, management & research, internship , seminar and thesis in Technical and Vocational Education (Tables 1-11).

Table 1: Course Units related to technology in the master level of Technical & Vocational Education

University	Technology	Number of courses
Wisconsin-Stout	Future of technology	1
Monash	Literacy and technology	1
Tun Hussein Onn University of Malaysia	Educational technology in technical and professional education; Information technology and the use of multimedia	2
Technical munich	Technology and education	1
Central Florida	-	-
Pardo	-	-

Table 1 indicates that in the selected universities of the United States of America, only the University of Wisconsin-Stout has assigned a course entitled "Technology with a futuristic approach" to this discipline. Also, Tun Hossein University of Malaysia has the largest number of titles related to educational technology for master degree in Technical & Vocational Education.

Table 2: Course Units related to Evaluation in the master level of Technical & Vocational Education

University	Evaluation	Number of courses
Pardo	Evaluation in vocational and technical education, assessment in vocational and technical education	2
Central Florida	Measurement and evaluation in education	1
Tun Hussein Onn University of Malaysia	Assessment and evaluation in technical and professional education	1
Technical Munich	-	-
Monash	-	-
Wisconsin-Stout	-	-

Based on the information in Table 2, assessment and evaluation has been assigned a subject title in half of the studied universities. In Purdue University, this subject has the highest number with the two titles of assessment and evaluation.

Table 3: Course Units related to Career and technical training research method in the master level of Technical & Vocational Education

University	research method	Number of courses
Pardo	Research in vocational and technical education	1
Wisconsin-Stout	introduction to research in vocational and technical education	1
Tun Hussein Onn University of Malaysia	Research and development method in technical and professional education, qualitative research in education	2
Technical Munich	Research in vocational and technical education	1
Central Florida	Statistics for Educational Information, Basics of Research in Postgraduate Education	2
Monash	-	-

The findings of Table 3 reveals that in the content of the vocational technical education curriculum in Tun Hossein Un University of Malaysia, Technical University of Munich in Germany, Purdue University and Wisconsin State University in the United States, the subject of vocational and technical education research is considered, while only the "University of Central Florida" has offered courses under the title of statistics and principles of research in the graduate course.

Table 4: Course Units related to curriculum in the master level of Technical & Vocational Education

University	Curriculum	Number of courses
Pardo	Curriculum in vocational and technical education	1
Wisconsin-Stout	Curriculum design and training, career development	2
Monash	Curriculum for work-related learning	1
Tun Hussein Onn University of Malaysia	Curriculum design in technical and professional education; Pedagogy in technical and professional education	2
Technical Munich	Curriculum design and training	1
Central Florida	Curriculum design and evaluation	1

According to the findings of Table 4, all the studied universities have dedicated at least one course to describe the curriculum of this field, titles such as curriculum design, evaluation and teaching.

Table 5: Course Units related to Teaching principles and techniques in the master level of Technical & Vocational Education

University	Teaching principles and techniques	Number of courses
Pardo	Training of generalizable skills, vocational training techniques, training in vocational and technical education, vocational and technical training for learners with special needs, vocational training, training of generalized skills in vocational and technical education	6
Wisconsin-Stout	Marketing and business training, principles of occupational and technical training, professional principles and technical training	3
Monash	Adult learning and curriculum in the workplace, vocational education and training, policies and procedures, communicative language teaching, language teaching for specific purposes, education and training	6
Tun Hussein Onn University of Malaysia	Micro education in technical and professional education, teaching practice	2
Technical Munich	Marketing training, work-based learning, technical training	3
Central Florida	professional training	1

Based on the findings of Table 5, the principles and techniques of teaching technical and vocational education are important in all the studied universities and at least one lesson is dedicated to this topic. America's Purdue University and Australia's Monash have considered the largest number of courses with 6 titles. Business and work-based or on-the-job training has been considered at Monash University, Technical University of Munich and Wisconsin-Stout.

Table 6: Course Units related to Philosophy of TVE in the master level of Technical & Vocational Education

University	Philosophy of TVE	Number of courses
Pardo	Principles and philosophy in vocational and technical education	1
Wisconsin-Stout	Principles and philosophy of technical and vocational education	1
Monash	Philosophical topics in developing technical and professional education curriculum	1
Tun Hussein Onn University of Malaysia	Educational philosophy in technical and professional education	1
Central Florida	Principles and philosophy in vocational and technical education	1
Technical Munich	Philosophy of technical and professional education	1

It can be seen in table 6, the philosophy of technical & vocational education is one of the courses that all universities have included in the curriculum of this field.

Table 7: Course Units related to Problems and challenges of technical and professional education in the master level of Technical & Vocational Education

University	Problems and challenges	Number of courses
Pardo	Contemporary topics and issues in vocational and technical education	1
Wisconsin-Stout	Challenges in vocational & technical education; Vocational principles and technical education, marketing and training issues; Issues related to vocational & technical business education	3
Monash	Challenges of vocational & technical education, policy and legal issues in education	2
Tun Hussein Onn University of Malaysia	-	
Central Florida	-	
Technical Munich	-	

Table 7 reveals that examining the issues and challenges of technical & vocational education has been important in half of the surveyed universities. Among the selected universities, the University of Wisconsin-Stout has dedicated the highest number of course units to the issues and challenges of technical & vocational education .

Table 8: Course Units related to Adult Education in the master level of Technical & Vocational Education

University	Adult Education	Number of courses
Monash	Adult learning & curriculum at work; Literacy in the field of adults; Adults & further education	3
Central Florida	Adult education, adult education learning, adult vocational education, teaching for diversity in adult vocational education and higher education	4
Pardo	-	
Tun Hussein Onn University of Malaysia	-	
Wisconsin-Stout	-	
Technical Munich	-	

As can be seen in Table 8, in the curriculum of the master's course in technical and vocational education at Monash and Central Florida universities, more than one lesson has been dedicated to the topic of adult education and its role and quality of adults' learning in vocational education and work environment .

Table 9: Course Units related to Counseling and guidance in the master level of Technical & Vocational Education

University/title	Counseling and guidance	Number of courses
Monash	Cognitive psychology; Learning and training	2
Tun Hussein Onn University of Malaysia	Educational psychology in technical and professional education	1
Pardo	–	–
Central Florida	–	–
Wisconsin-Stout	–	–
Technical Munich	–	–

Table 9 indicates that only in Monash and Tun Hossein universities, those courses related to counseling and guidance (educational psychology) are offered to students among the courses of vocational and technical education**.**

Table 10: Course Units related to Internship, seminar and thesis in the master level of Technical & Vocational Education

University	Internship, seminar and thesis	Number of courses
Wisconsin-Stout	Seminar in profession and technical education; Vocational training	2
Tun Hussein Onn University of Malaysia	Internship Senior expert project 1; Senior expert project 2	2
Technical munich	Seminar in profession and technical education and training	1
Central Florida	–	–
Monash	–	–
Pardo	–	–

Based on the information in Table 10, the University of Wisconsin-Stout, Tun Hussein Onn University of Malaysia and the Technical University of Munich have each assigned two course titles to internship, seminar and dissertation topics **.**

Table 11: Course Units related to management in the master level of Technical & Vocational Education

University	Management	Number of courses
Pardo	Supervision in vocational and technical training, organization and coordination in technical and professional training	2
Wisconsin-Stout	Education management & leadership, education manager, planning & resource management	3
Monash	Curriculum management	1
Tun Hussein Onn University of Malaysia	Leadership and management in technical and professional education	1
Technical Munich	Management of technical and professional education, resource management	2
Central Florida	-	-

The findings of Table 11 reveal that most of the studied universities have included management-related course units in the curriculum of technical and professional education. The University of Wisconsin-Stout in the USA has dedicated the most course units to the subject of management with 3 courses**.**

Fourth Step) Comparison

The results of the analysis of the courses indicated the existence of similarities and differences between the selected countries regarding the content of the master's curriculum of technical & vocational education**.**

Table No. 12: General titles of courses in the studied universities

University name	Technology	assessment	Management in TVE	Curriculum	Issues & challenges in TVE	Adult Education	Research	Principles of teaching	Philosophy	Internship, seminar and thesis	Psychology and counseling
Wisconsin-Stout	*	–	*	*	*	–	*	*	*	*	–
Pardo	–	*	*	*	*	–	–	*	*	–	–
Monash	*	–	*	*	–	*	–	*	*	*	*

Tun Hussein Onn University of Malaysia	*	*	–	*	–	–	*	*	*	*	*
technical munich	*	–	–	*	*	–	*	*	*	*	–
Central Florida	–	*	–	*	–	*	*	*	*	–	–

As Table 12 indicated there are similarities between the selected universities in the presentation of three courses under the headings of curriculum, principles of teaching in technical & vocational education, and philosophy. Also, these universities do not follow the same procedure in providing the following course units for their students: Technology, evaluation, management in technical & vocational education, issues & challenges in technical & vocational education, adult education, research in technical & vocational education, internship, seminar & thesis and counseling & psychology in technical & vocational education.

Similarities

- *Curriculum:* This course has been included in the curriculum of all universities. Three universities of Wisconsin-Stout, Purdue and Monash have considered similar titles for this course and have addressed the curriculum of technical & vocational education, career and work-related specifically with this difference that Tun Hussein Onn University of Malaysia, Technical University of Munich and Central Florida have considered the general title of curriculum design.

- *Teaching principles in technical & vocational education*: All selected universities have at least one course related to technical and professional education. Purdue and Monash universities have considered different courses from other universities related to teaching principles and techniques. Among these courses, we can mention subjects like vocational and technical training for learners with special needs, vocational training, and generalized skills training in vocational and technical training.

- *Philosophy*: This course title is included in the technical and vocational master's course table of all universities. Monash and Tun Hussein Onn University of Malaysia have used the term "philosophy of technical & vocational education" to explain the philosophy of technical & vocational education.

Differences

- *Technology*: Tun Hussein Onn University of Malaysia has specifically included the course "Technology in the field of technical & vocational education" among the topics of this field, with the difference that the courses of the future and technology, literacy and technology, and education and technology in University of Wisconsin-Stout, Monash and Technical University of Munich are related to technology.
- *Evaluation*: Purdue University, Central Florida and Tun Hussein Onn University of Malaysia have a course with the same title under the subject of "Evaluation in Technical & Vocational Education", while the University of Wisconsin-Stout, Monash and Munich did not consider teaching this subject necessary for students.
- *Management in Technical & Vocational Education*: Tun Hossein University and Technical University of Munich choose the similar title of "Management of Technical & Vocational Education" and Wisconsin-Stutt and Technical University of Munich choose the similar title of "Resource Management". In the meantime, Monash University has chosen the titles of "Curriculum Management" and "Management in Education" which are more general titles.
- Problems & challenges of technical & vocational education: The two universities of Wisconsin-Stutt and Technical University of Munich are similar in offering courses under the title "Marketing Education" and "Problems & Challenges of Technical & Vocational Education", while the course "Principles of technical and professional education" is one of the similar course titles in most of the selected universities.
- *Adult education*: Only two universities, Monash and Central Florida, have paid special attention to the subject of adult education in their curriculum by offering various topics to students, while the University of Central Florida has more diversity in its curriculum related to professional education.
- *Research in Technical & Vocational Education*: While there are similarities between Purdue, Wisconsin-Stout, Tun Hussein Onn University of Malaysia and Technical

University of Munich regarding the presentation of a course unit under the title "Research in Technical & Vocational Education ", in University of Central Florida statistics courses are also included in the curriculum content.

- *Seminar, Internship and Dissertation*: The curriculum of Wisconsin-Stutt and Technical University of Munich are similar due to considering the two courses of "seminar" and "internship" in the curriculum content of the field. However, in the curriculum of Tun Hussein Onn University of Malaysia, those two courses "Project 1 and 2" are considered under the internship, seminar and thesis series, unlike other universities. Also, Monash, Purdue and Technical University of Munich have not provided any course under this topic.
- *Psychology and Counseling*: In Tun Hossein University, Malaysia, different from other universities, the course "Educational Psychology in Technical & Vocational Education" is offered as a specialty, while in Monash University, the course is "Cognitive Psychology; Learning and Education" - which is a general title- placed in curriculum of the field.

4. Conclusion

The field of technical & vocational education at the master's level has been running in many universities of the world for more than two decades. The content of the curriculum of this course using different titles - but with a common purpose and function - has been planned in line with the development of the professional competence of teachers and trainers of technical & vocational education. The first finding of this research showed that the following subjects are taught to students in the selected universities in the master's course of technical & vocational education: Principles of teaching in technical and professional education, philosophy, technology, evaluation, management in technical and professional education, curriculum, issues & challenges in technical and professional education, adult education, research in technical and professional education, internship, seminar and dissertation, psychology & counseling. Also, it was found that in all six selected universities, teaching principles, philosophy and curriculum courses are offered. Among the findings is the importance of the position of courses related to the principles of teaching in the studied universities. This finding is in line with the research results of Sern, Hamisu, & Salleh, (2018), Johansson, (2020), and Kilbrink & Asplund, (2020).

Philosophy of technical & vocational education, like "Principles of Teaching", is one of the courses that have been noticed by the curriculum planners in all the selected universities. This finding supports the researches of (Schmidtke& Chen, 2012 and Estriyanto, 2016). Curriculum and its design is the title of a course that has a special position in this field. Due to the changeability of

professions, the curriculum of technical and professional education should be designed and developed according to the needs of the work field. Therefore, the need of the working world has made the curricula in the technical and vocational education system different from other curriculum areas. This finding was also confirmed in the researches of Widiaty&Ana, (2015) and Kirior, (2017).

The next finding showed that the selected universities in the number and title of the courses dedicated to the subjects of technology, evaluation, management in technical and vocational education, issues & challenges in technical education, Professional and adult education, research in technical and vocational education, internship, seminar and dissertation, psychology & counseling are different from each other. Wisconsin Stout, Monash, Tun Hussein Onn University of Malaysiaand Munich universities are among the universities that seem to have paid attention to courses with the theme of "future of technology" due to the emergence of artificial intelligence phenomenon and its effects on the economy and labor market. This finding is also observed in the researches of Beer& Mulder, (2020) and Köhler& Drummer, (2018).

Research and familiarity with research methods in all fields and educational courses - especially in higher education - is important. For this reason, this subject is also included in the technical & vocational education curriculum of the studied universities. Also, in skill-based education, evaluation is considered as the basis for granting competencies and for this reason, familiarity with the basics and principles of evaluation in technical and professional education is of interest to curriculum planners. This finding is in line with the research findings of CEDEFOP, (2019); UNESCO, (2015) and OCED, (2023). Based on the findings courses related to seminars, dissertations and internships is included in the course table of more than half of the universities of the selected countries. In the next position, there are courses related to the issues & challenges of technical and professional education, adult education and psychology & counseling. The conclusion of the researchers from the findings is that in the higher education system, the training of technical and professional teachers is in the realm of "interdisciplinary" knowledge. According to the titles of the technical and professional education curriculum in the selected universities, the subjects of this field can be considered as a combination of courses related to educational sciences, economic sciences, philosophy and engineering sciences. According to the study of the experiences of the researched countries, the following suggestions are presented for the policy makers and planners of technical and vocational education in Iran:

- The establishment of a master's degree course in technical & vocational education for trainers and activists in order to create and form the development of professional skills and

create the necessary motivation and ability of specialists and a stronger presence of the country in the national and international levels,

- Inclusion of the following subjects in the curriculum of technical & vocational education based on international experiences and considering national requirements: Teaching principles in technical & vocational education, philosophy of technical & vocational education professional, technology in technical & vocational education, evaluation in technical & vocational education, management in technical & vocational education, curriculum, issues & challenges in technical & vocational education, adult education, research in technical & professional education, internship, seminar & thesis, psychology & counseling, and
- Improving the current approaches in the field of technical & professional education teacher training.

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