

# Integrating Ideological and Political Education in Manufacturing Execution System (MES) Curriculum: Design, Implementation, and Practical Pathways

Baihui Ma

Department of Automation, Century College, Beijing University of Posts and Telecommunications, Beijing, 102101, China

**Abstract:** "Manufacturing Execution System (MES)" is an important professional course in the course system of automation specialty. According to the actual teaching situation, this paper will analyze the teaching design and implementation of ideological and political education in the course of "Manufacturing Execution System (MES)", deeply excavate the teaching elements of ideological and political education, develop new teaching objectives and teaching contents, and explore the practical path of ideological and political education in professional courses.

**Keywords:** Manufacturing Execution System; Curriculum Ideological and Political Education; Teaching Design; Practice.

## 1. Introduction

"Manufacturing Execution System (MES)" is an important professional course in the automation professional curriculum system, through the course of study, students can understand the basic concepts of intelligent manufacturing, digital workshop and workshop production and operation management, understand the composition, functions and uses of MES, master the operation of MES, master the basic theoretical knowledge, technology and skills to engage in MES operation and maintenance, implementation, consultation, design or development in large manufacturing enterprises, industrial system integrators, industrial software developers and other enterprises or institutions, consequently grow into composite industrial engineering talents with strong practical ability and high comprehensive quality.

This paper takes "Manufacturing Execution System (MES)" as an example, combines with my own teaching

practice, shares the practical experience of curriculum ideological and political teaching from three aspects: curriculum ideological and political teaching goal design, curriculum ideological and political teaching content system development, curriculum ideological and political teaching implementation path [1].

## 2. Design of Ideological and Political Teaching Objectives for the Course "Manufacturing Execution System"

The design idea is to focus on professional training requirements, in-depth excavation and sorting out the course's ideological and political elements, from the students' knowledge, ability, emotion, attitude, values and other dimensions, to condense the formation of the course's ideological and political teaching objectives framework.

**Table 1.** Objectives of Ideological and Political Teaching in Manufacturing Execution System (MES) Course

Chapter Contents	Objectives of Ideological and Political Teaching
1.Introduction	Clarify the importance and necessity of national strategies such as "Made in China 2025" and "14th Five-Year Plan for Intelligent Manufacturing Development", understand major policies such as "transformation and upgrading" of enterprises, cultivate students' global vision, improve their patterns, and enhance their sense of responsibility and historical mission. Sense of responsibility and historical mission
2.MES Functional Modules	Make students think about the implementation path of "Stronger Manufacturing Country" and "Stronger Quality Country", and cultivate their ability to apply what they have learnt to solve the problems they encounter at work, at school and in the society. Cultivate students' awareness of standardisation, stimulate students' national pride, and clarify their mission.
3.MES project implementation	Focus on the development of students' ability to formulate personal development goals, career planning, daily work plan formulation and implementation, and time management. Cultivate students' engineering awareness and pioneering and innovative spirit
4.Project practice: a small machine processing enterprise system design	Cultivate students' ability to connect theory with practice and teamwork through field research and analysis of enterprises.
5.Project practice: a large automotive production company's manufacturing operation mode and applications	Importance, urgency, implementation path and specific tasks of the strategy of "Strengthening the Quality of the Country", explaining the benchmark practice of "craftsmanship", and cultivating students' professionalism and sense of responsibility in the times. Through the typical application of the automobile industry, the understanding and experience of MES will be extended to other related manufacturing industries, so that students will realise that MES has a broad application prospect, which will stimulate students' interest and enthusiasm for learning, increase the purpose of learning, and make learning useful.

"Manufacturing Execution System (MES)" has a wide knowledge coverage, strong practicality, and is directly related to the national economic development strategy and enterprise management. Combined with the main content of the course, we take the spirit of the report of the 20th National Congress of the Communist Party of China and the series of speeches of General Secretary Xi Jinping as the guidance, and sort out the topics of "Quality Stronger Nation", "Made in China", "Internet+", "Worker's Rights", and "Workplace Safety"., "Craftsmanship", "Innovation", "Professionalism", "Self-management" and other ideological elements. " ideological and political elements such as "Internet+", "Craftsmanship", "Innovation", "Professionalism", "Self-management", etc. In order to avoid "fragmentation", through summarising and refining, "Three Main Lines" are formed: national strategy, current affairs and the cultivation of self-core quality.

On the basis of condensing the ideological and political elements and based on the characteristics of the course, we set the overall objectives of ideological and political teaching: taking the national strategy, current affairs and the actual

situation of the enterprise as the base, running through the above sorted out ideological and political elements and organically integrating these ideological and political elements into the teaching of the course, and silently guiding and encouraging students to cultivate the core qualities of themselves.

Based on the overall ideological and political teaching objectives, centred on the "Three Main Lines", and based on the excavation of the ideological and political elements embedded in the professional knowledge points of each chapter, the ideological and political teaching objectives of each chapter are further developed on the basis of the logical sequence, consistency and relevance of each chapter. See Table 1 for details.

### 3. Development of Content System for Ideological and Political Teaching in "Manufacturing Execution System (MES)" Course

**Table 2.** Content of Ideological and Political Teaching in Manufacturing Execution System (MES) Courses

Chapter Contents	National strategies (interpretation of the strategy of "Strong Manufacturing Country" and "Strong Quality Country" and the implementation path)	Current affairs (interpretation of major events in recent years)	The development of core qualities of self
1.Introduction	Interpretation of national strategies such as "Made in China 2025" and "14th Five-Year Plan for Intelligent Manufacturing Development", which will lead students to think about the importance and necessity of the strategies.	Interpretation of major policies such as "transformation and upgrading" of enterprises.	Cultivate a global perspective and enhance students' patterns, while increasing their sense of responsibility and historical mission
2.MES Functional Modules	Ask students to think about the implementation path of "Stronger Manufacturing Country" and "Stronger Quality Country".	Ltd. (e-works) as an example to show the current situation of MES technology and development.	Cultivate students' ability to apply what they have learnt to answer questions they encounter at work, at school and in society. Cultivate students' awareness of standardisation, stimulate students' national pride, and clarify their mission.
3.MES project implementation	The transformation of "Made in China" to "Created in China".	MES application case of Guizhou Yonghong Heat Exchanger & Cooling Technology Co., Ltd. to explain the upgrade of enterprise from "manufacturing" to "intelligence".	Focus on the development of students' ability to set personal development goals, career planning, make and implement daily work plans, and time management. Cultivate students' engineering awareness and pioneering spirit
4.Project practice: the system design of a small-scale machinery processing enterprises	The new thinking of enterprises under "Industry 4.0" and "Internet Plus" and the choice of production operation mode.	MES application case of Renben Group Co., Ltd. to explain the importance and necessity of MES in machining enterprises.	Cultivate students' ability to connect theory with practice and teamwork.
5.Project practice: a large automobile production company's manufacturing operation mode and applications	Group discussion on "Stronger Quality Nation", to understand the strategy of "Stronger Quality Nation", and guide students to apply what they have learnt in the course to analyse the bottlenecks of quality enhancement and the countermeasures to solve the problems, so as to make students understand the importance of quality management and the urgency of "Stronger Quality Nation".	The development of China's "Government Quality Award".	Stimulate students' interest and enthusiasm for learning, increase the purposefulness of learning, and make learning practical

"Manufacturing Execution System (MES)" establishes the correlation between the knowledge points of the various chapters of ideological and political education around the "Three Main Lines" (national strategy, current events and the cultivation of self-centred literacy). The three main lines run through all chapters of the course, as shown in Table 2.

## **4. Path to the Implementation of the "Manufacturing Execution System (MES)" Course on Ideology and Politics**

### **4.1. Constructing Theme-introduction Teaching to Cultivate Students' Patriotic Awareness**

In the teaching of "Manufacturing Execution System (MES)", we can use evidence-based entry, analogy-based entry, reflective entry, inspirational entry and other ways to enter the teaching theme, so that students can understand the domestic and international manufacturing industry, and through the national strategy and current affairs hot spots into the elements of the ideology and politics, to cultivate the students' vision of the world, and to improve the students' pattern, enhance the students' sense of responsibility and sense of historical mission, stimulate the students' patriotic passion, and cultivate the students' patriotic consciousness. students' pattern, enhance students' sense of responsibility and historical mission, stimulate students' patriotic passion, and cultivate students' patriotic consciousness. For example, the use of reflective entry to provoke students to think about the problems existing in the traditional production workshop; the use of heuristic entry to ask students what solutions should be taken for the problems existing in the traditional production workshop, so as to let students deeply understand the concept and significance of MES; the use of evidence-based entry to the current development data of China's industrial and manufacturing industries, guiding students to discover that our country is moving from a large manufacturing country to a strong manufacturing country; the use of analogical The way to let the students of China and other countries to compare the industrial manufacturing industry, to understand the results of the efforts made by our forefathers, to establish a strong national self-confidence [2].

### **4.2. Integrate Social Elements to Cultivate Students' Awareness of Laws and Regulations and Standardisation.**

In order to create a classroom atmosphere with ideological tension, it is necessary to be based on the construction requirements of curriculum ideology and politics, strengthen the education of laws and regulations, improve the connotation of the ideology and politics course, allow students to establish a good sense of compliance with the law and standards, and cultivate a sense of personal responsibility and good ethical behaviour in students. For example, when teaching manufacturing BOM, it incorporates the knowledge of production resource model and product definition model. Among other things, the ISO/IEC 62264-1 standard describes object models of production resources that provide a unified language and tools in MES development, consulting and implementation. In MES software development, classes of objects can be designed based on these models; in MES

consulting or implementation, these models can also be used to describe design or implementation solutions. It can be extrapolated to compliance. Nothing can be done without rules. Discipline and adherence to rules will lead to a peaceful and orderly society. When teaching the ISO 9000 family of standards for quality assurance systems in quality management, the importance of building a standardisation system is emphasised to develop students' awareness of standardisation.

### **4.3. Infiltrate Marxist Philosophical Theories to Improve Students' Moral Cultivation**

Marxist philosophical theory is an important part of the political education of all professional courses, teachers should fully explore the integration of the "Manufacturing Execution System (MES)" course with Marxist philosophical theory, and cultivate students' Marxist philosophical level and moral cultivation. For example, when teaching "Project Practice: System Design of a Small-Scale Machinery Processing Enterprise", the teacher explains to the students a basic truth by explaining the definition of user requirements and functional design of the system, in order to design and develop a set of MES suitable for manufacturing enterprises or manufacturing organisations, it is necessary to master the basic theory, technical details and experience of MES, so that the students can make sense of the basic theory, technical details and experience of MES. Experience, so that students clarify the relationship between theory and practice, theory comes from practice, in turn, theory guides practice.

### **4.4. Strengthen the Penetration of the Concept of Product Quality and Cultivate Students' Professionalism**

In the "Manufacturing Execution System (MES)" professional programme, "quality management" is the core of enterprise development, and it is also a necessary way to integrate into the ideological education, which requires students to clearly understand the importance of quality management to the development of enterprises.

Students should clearly understand the importance of quality management to the development of enterprises, enhance their awareness of quality management, and establish a good spirit of integrity and responsibility. For example, when explaining the quality management system, by introducing the journey of Zhang Ruimin of Haier Group, a national enterprise, who smashed 76 unqualified refrigerators and won the National Quality Award in 1985, students are equipped with quality awareness and their sense of responsibility is enhanced. Taking real events as the starting point, students can have intuitive perceptual experience to improve their learning awareness and deepen their learning impression. In addition, through the class group discussion on the "quality of the country" related to the discussion, understanding the quality of the country strategy, guide students to use the knowledge learned in the course to analyse the bottlenecks in quality improvement and countermeasures, so that students can understand the importance of quality management and the urgency of the "quality of the country". so that students can understand the importance of quality management and the urgency of "Quality Strong Country".

#### 4.5. Provide Life and Study Guidance to Improve Students' Personal Qualities

Improving students' personal qualities is the top priority of professional courses in the ideological teaching, good personal qualities including life, habits, morals, behaviour and other aspects, in the "Manufacturing Execution System (MES)" course ideology needs to be integrated into the elements of the ideological education, so that the students to develop good personal behaviour, work awareness, habits, and comprehensively improve the students' personal qualities. The overall improvement of students' personal qualities. Taking "field management" as an example, for example, in the field teaching activities, we can explain to students that the most suitable management method for field management is "5S" management, so that students can adopt this management method for self-management and strengthen their self-discipline and management ability. In the process, teachers need to pay close attention to the students' life and study, so that they can maintain a good attitude and habits, and continuously improve their personal qualities. In this process, teachers need to pay close attention to each student's own situation, targeted guidance for students' own shortcomings, so that students in the neat, clean, hard-working habits of learning and living, to get the effective enhancement of personal qualities.

In the explanation of "MES project implementation", explained that "three parts of the system, seven parts of the implementation", a good implementation team is to ensure that the MES can produce the most important part of the value, not only to have a good product, at the same time the implementation team should also be on the enterprise to carry out adequate Not only should there be a good product, but the implementation team should also conduct sufficient analysis and research on the enterprise, and tailor the system implementation plan according to the actual situation and needs of the enterprise, so as to allow MES to play the greatest value, to ensure that the ROI of the enterprise MES. before the implementation of the MES project, the enterprise needs to clearly define the implementation of the MES project strategy and methodology and other content, the better the pre-system planning, the enterprise on the implementation of the MES project, the clearer the idea, then the final results of the implementation of the MES project, the better. The better the preliminary system planning, the clearer the idea of MES project implementation, the better the final effect of MES project implementation. Through applied experiments, students are guided to establish a sense of planning and improve their time management ability while understanding the course content, and at the same time focusing on the training of students' thinking methods, so that they can gradually establish a systematic way of analysing problems.

#### 4.6. Through the Flipped Classroom, Mobilise Students' Motivation and Initiative in Learning.

Adhering to the teaching concept of "student-centred" in the teaching process, we adopt the teaching mode of flipped

classroom, and mobilise students' learning enthusiasm through the experiential teaching of "case discussion, scenario simulation and practical training".

The teaching process and teaching situation are designed with cases as the carrier, linking theoretical knowledge learning with social practice and carrying out task-driven teaching; students are allowed to raise problems, think about problems, research problems and solve problems, and the whole teaching process is always student-centred to cultivate students' initiative; at the same time, we cultivate students' abilities in presentation, making PPT, cooperation, communication and analysing problems with theories, and so on [3-5].

### 5. Conclusion

The Manufacturing execution system (MES) course is comprehensive and practical, and students' mastering of this course will play an important role in their future work. Therefore, the implementation of curriculum ideological and political reform in the course teaching process is more conducive to the realization of ideological and political education effect and curriculum teaching effect. According to the characteristics of this major, flexible teaching content is designed and integrated into ideological and political elements, and the curriculum system is comprehensively optimized, so that "Manufacturing execution system (MES)" is not only a professional course to improve students' knowledge and skills, but also a compulsory course that can affect students' core self-quality and moral behavior.

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