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EVALUATION OF INFORMATION TECHNOLOGY CURRICULUM FRAMEWORK THROUGH CONTEXT-INPUT-PROCESS-PRODUCT MODEL

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Abstract

Information technologies represent the main fields in vocational and technical education systems. Since the curricula of this field are technology-based, they need to be assessed and updated at shorter intervals compared to other curricula. Therefore, this study aimed to assess the framework curriculum in the field of Information Technologies in Turkey. The research was carried out based on a qualitative approach. The research design is a case study. The sample of the study was determined via maximum variation sampling. The sample determined for the study consists of Information Technology teachers working in vocational and technical upper-secondary schools in different provinces of Turkey. A semi-structured interview form was employed as a data collection tool. It has been found that the outcomes in the curriculum framework tend to be consistent, but they are above the student level. Timeliness, simplicity, and the availability of printed books are among the strengths of the curriculum framework. Insufficient physical conditions and lack of materials and equipment are among the aspects of the curriculum framework that need to be improved. Students' low level of readiness is stated as one of the main challenges in implementing the curriculum framework. Teachers have provided suggestions such as admitting students to vocational and technical upper secondary schools via exams, offering financial resources, establishing IT upper secondary schools, and transforming vocational upper secondary schools into project schools for an effective curriculum framework.
Keywords: *information technology, curriculum framework, CIPP model, qualitative approach.*

Introduction

The concept of vocation is defined as "a job that is based on systematic knowledge and skills acquired via a certain education, which is done to produce goods useful to people, to provide services as well as to earn money in return, and rules of which are determined" (TDK, 2023). This concept is one of the important issues of education systems. Making individuals have a profession is at the forefront of expectations from education (Bolat, 2017) and is considered among the aims of education. This aspect of education is expressed as vocational education. Vocational education contains the planning, research, development, organization, and coordinated management, supervision and teaching activities of agriculture, industry, and service sectors and all vocational and technical education within the integrity of the national education system (MEB, 2020). In Turkey, vocational training activities are given place in vocational and technical education (VTE) practices (Bolat, 2017).

At the secondary education level in Turkey, VTE is offered in formal and non-formal education. Formal education is performed in three school types: Vocational and Technical Anatolian Upper Secondary Schools (VTAHS), Multi-Program Anatolian Upper Secondary Schools (MPAHS), and Vocational Training Centres. Within the scope of non-formal education, Vocational Open Education Upper Secondary Schools offer education (MEB, 2018). Based on

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the 2021-2022 academic year statistics of the Turkish Ministry of National Education Directorate of Strategy Development, 1.31.556 out of a total of 6.318.602 students in secondary education in Turkey receive education in vocational and technical secondary education institutions. The number of vocational and technical secondary education institutions is 4.423 and 142.841 teachers work in these institutions (MEB, 2023a). As these statistics of the ministry show, VTE is paramount in the education system. As of 2023, vocational education has been provided in a total of 47 fields and 105 branches in vocational and technical secondary education (MEB, 2023c).

VTE aims to train qualified workforce and intermediate staff who have national and international professional competence, professional ethics, and professional values, who are innovative, entrepreneurial, productive, and who add value to the economy through cooperating with social and economic sectors (Bolat, 2017; MEB, 2018). Among the priorities for vocational and technical secondary education in Turkey is to continuously improve the VTE system and enhance its quality (MEB, 2018). In this context, curricula are designed and implemented based on curriculum development studies. VTE field curriculum is designed to prepare individuals for business life. These curricula consider the needs of the labour market and are based on a job analysis method. In the job analysis method, occupations are analysed, occupational profiles are defined, and the work and operations a professional must perform are identified. Curricula are planned to prepare individuals for business life by providing them with the knowledge, skills, attitudes, and behaviours they need to fulfil the jobs and operations via courses (MEB, 2020).

In Turkey, modular curricula based on competencies have been implemented in VTE as of the 2005-2006 academic year (MEB, 2014). Nonetheless, it was found that the benefits of the modular curricula were limited and that the curricula in vocational education should be updated based on the current needs (Canbal et al., 2020). Hence, the new curriculum framework has started to be put into practice. A framework curriculum is defined as a curriculum whose general objectives, principles, methods and sometimes tools and materials are determined centrally, but which allows freedom of movement to local school organisations or individual schools in matters like the selection of learning experiences, making daily work schedules, and solving problems which arise during implementation (TDK 2023). In this context, in information technology (IT), one of the fields in vocational and technical secondary education, with the decision of the Presidency of the Board of Education in Turkey dated 19.08.2020 and numbered 21, the curriculum framework was gradually implemented starting from the ninth grade as of the 2020-2021 academic year (MEB, 2023b).

Within the last five years, different studies have been performed in Turkey and around the world to evaluate the situation of vocational and technical education and to focus on the relevant problems (Chukwu et al., 2020; Dahil et al., 2015; Erten, 2022; Hu & Gong, 2022; Schröder, 2019; Sevilla et al., 2023; Zhang et al., 2020). There are different studies investigating curricula in the field of information technologies (Chen et al., 2023; Cheng & Wang, 2022; Li et al., 2023; Liu et al., 2021; Zhao et al., 2023). In evaluation studies on vocational and technical secondary education (Adıgüzel & Berk, 2009; Duman & Sargın, 2019; Ekşioğlu & Taşpınar, 2014; Gürlek, 2010; Gömleksiz & Erten, 2010a; Gömleksiz & Erten, 2010b), modular curriculum was foregrounded. Only in Berk's (2012) doctoral dissertation, the evaluation was performed through a curriculum evaluation model. Studies on evaluating vocational and technical secondary education curricula for the field of IT, the subject of this research, (Arabacıoğlu, 2013; Engin & Gürses, 2017; İşoğlu, 2010; Sert, 2007) were limited in terms of quantity and in terms of modular curriculum. In the research by Canbal et al. (2020), designed as a document review, the suitability of the curriculum framework with the objectives expressed in the top policy documents was evaluated. Apart from this study by Canbal et al. (2020), no other study evaluates the curriculum framework.

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In this study, evaluation was performed using Stufflebeam's Context-Input-Process-Product (CIPP) model, which is a curriculum evaluation model. The CIPP model was preferred since it is one of the most effective models for evaluating different types of programs (Kim Anh, 2017; Lee Abdullah & Wei, 2017; Jamil & Mukhadis, 2017; Mayo & De Balazs, 2013; Suspalupi et al., 2018; Yurdakul et al., 2014). The fundamental concepts of the CIPP model are context, input, process, and product evaluation, as in its acronym. Context evaluations tend to evaluate needs, problems, and opportunities in a defined environment. Input evaluations tend to evaluate the work plans and budgets of the methods selected for implementation. Process evaluations monitor, document, and evaluate activities. Product evaluations determine and evaluate short- and long-term intended and unintended learning outcomes. In the CIPP model, evaluators are expected to provide their target audiences with high-quality evaluations to help them develop needed services and products (Stufflebeam, 2000). In this context, the model is thought to enable a systematic and multidimensional method to the curriculum framework. On the one hand, the evaluation of the curriculum from the perspective of the field of information technology teachers was considered necessary to show the impact of the curriculum in practice.

The main aim of the study was to evaluate the Information Technology Curriculum Framework through the CIPP model. Within the scope of this purpose, the following research questions have been determined:

- What are the opinions of information technology teachers on the context dimension of the curriculum framework?
- What are the opinions of information technology teachers on the input dimension of the curriculum framework?
- What are the opinions of information technology teachers on the process dimension of the curriculum framework?
- What are the opinions of information technology teachers on the product dimension of the curriculum framework?

Research Methodology

Research Design

The research is based on qualitative approach. The research design is a single-embedded case study design. A single embedded case study design involves more than one unit of analysis (Yin, 2009). In this context, the case dealt with in the research is the curriculum framework itself. While analysing the curriculum framework, it is divided into more than one unit of analysis. The units of analysis are context, input, process, and product, which are the basic concepts of the CIPP model. That is to say, the curriculum framework as a case was analysed through these four units of assessment.

Study Group

The study group was determined through maximum variation sampling. In this context, information technology teachers working in vocational and technical upper secondary schools in different provinces of Turkey were accessed. Table 1 includes information regarding the study group.

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Table 1
Information Regarding the Study Group

Participant	Province/District	Seniority	Type of Upper Secondary Schools	Educational Status
P1	Kastamonu/Küre	14 Years	MPAHS	Postgraduate
P2	Siirt/ Province	14 Years	VTAHS	Undergraduate
P3	Kastamonu/Tosya	14 Years	VTAHS	Postgraduate
P4	Giresun/Dereli	10 Years	MPAHS	Postgraduate
P5	Bartın/ Province	20 Years	VTAHS	Postgraduate
P6	Ankara/Çankaya	6 Years	VTAHS	Undergraduate
P7	Kastamonu/ Province	7 Years	VTAHS	Undergraduate
P8	Karabük/Safranbolu	15 Years	VTAHS	Undergraduate
P9	Karabük/Safranbolu	15 Years	VTAHS	Postgraduate
P10	Çorum/ Province	9 Years	VTAHS	Undergraduate
P11	Bartın/ Province	16 Years	VTAHS	Postgraduate
P12	Bartın/ Province	16 Years	VTAHS	Undergraduate
P13	Bartın/ Province	14 Years	VTAHS	Postgraduate
P14	Bartın/ Province	17 Years	VTAHS	Undergraduate
P15	Bartın/ Province	16 Years	VTAHS	Undergraduate
P16	Kastamonu/Araç	7 Years	MPAHS	Postgraduate

A total of 16 participants took part in the study group. No specific rule is present for sample size in qualitative research (Patton, 2002). Nevertheless, Lincoln and Guba (1985) suggest the saturation point in sample selection. Sampling is terminated when new information does not come from the newly sampled units. This implies that the saturation point has been reached. In this study, the saturation point was reached with 16 participants. The names of the participants were kept secret and expressed with codes in the form of P1, P2 and so forth. The participants work in Bartin, Kastamonu, Siirt, Giresun, Ankara, and Karabük provinces, and their professional seniority vary from four to 20 years. The participants from different educational situations work in vocational and technical Anatolian and multi-program Anatolian upper secondary school types.

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Data Collection Tool

As a data collection tool, the structured individual interview form benefited (Appendix). The structured individual interview form was created based on the research questions. The pool of questions created on the basis of the CIPP curriculum evaluation model was sent to two experts in the field of curriculum and instruction. As a result of the expert opinions, the structured individual interview form was finalised, consisting of four questions regarding the context dimension, three questions regarding the input dimension, three regarding the process dimension, and one regarding the product dimension, totalling eleven questions.

Data Collection Processes

Interview days and times were planned in consultation with the participants. The data collection took 15 days. Some of the interviews took place face-to-face, and some of them took place online- a cloud-based video conferencing platform (Zoom). Face-to-face interviews were performed in the schools where the participants work, mostly during lunch breaks, by making audio recordings. Online interviews were performed via Zoom. Online interviews were carried out in the evenings at the convenience of the participants. All interviews were realised in a single session, each lasting 45-60 minutes on average.

Data Analysis

The data were analysed with an inductive approach. The inductive approach attempts to access the whole from the parts and adopts to make sense out of the whole (Tracy, 2013). The analysis was performed based on Creswell's (2009) analysis stages. First of all, the audio recordings were converted into written texts. Based on the read data, codes suitable to the theoretical structure were extracted. The codes were scrutinised and collected under certain themes and sub-themes. All these structures were presented with colourful figures.

Validity and Reliability

The precautions and considerations taken to increase the validity and reliability of the research are as follows: The research sample was determined in detail to allow comparison with other samples. The sample has been tried to vary as much as possible. In this context, maximum diversity sampling was taken as a basis. The research findings can be tested with a similar sample. It was found that the research findings were in harmony with themselves and with the existing conceptual framework. The findings were presented to the participants and colleagues for confirmation and were found to be realistic. The raw data of the research was kept in a way that others can investigate. The stages of the research, research questions, methodology, and findings were explained in detail. The findings were supported by figures. During the data collection phase, audio and video recordings were taken within the framework of ethical rules. Direct quotations were included to offer the data without interpretation.

Research Results

Contextual Dimension

Students' Needs for Information Technology and The Sufficiency of Curriculum Framework in Meeting These Needs

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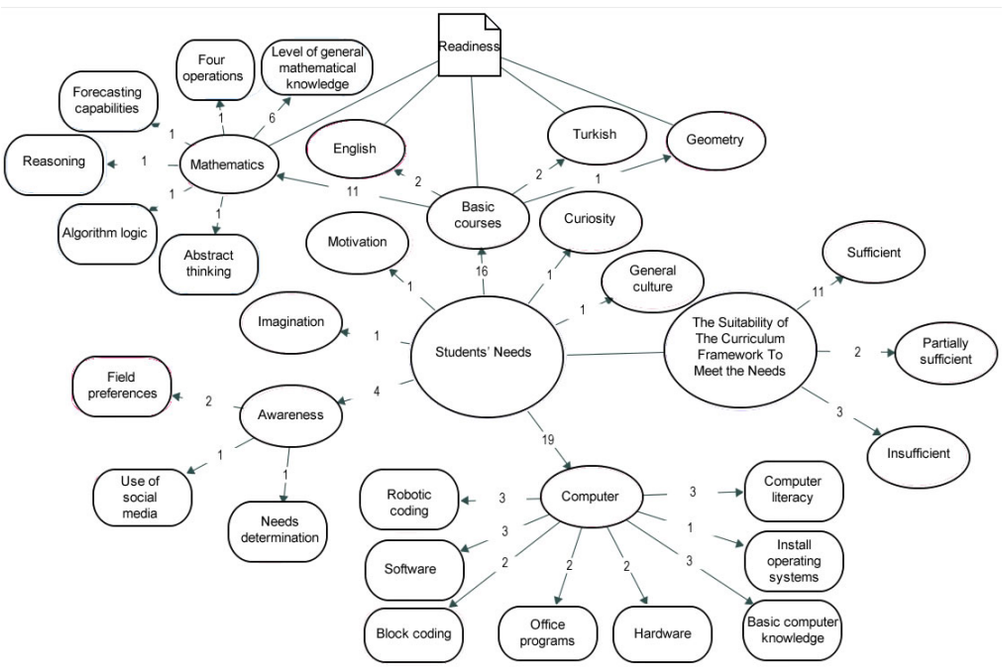
Teachers' opinions on students' needs for information technology and the suitability of the curriculum to meet these needs are presented in Figure 1.

Figure 1

Needs for Information Technology and The Suitability of The Curriculum Framework to Meet These Needs



From the teachers' perspective, students' needs for information technology were grouped under the themes of basic courses, general culture, computer, awareness, imagination, curiosity, and motivation. According to the teachers, students' insufficient level of readiness and knowledge in mathematics, Turkish, English, and geometry courses is an essential factor that decreases success in the field of information technology. Mathematics was the most frequently mentioned course. The opinions on mathematics courses were further elaborated, and the low level of general mathematical knowledge, four operations, forecasting capabilities, reasoning, algorithm logic, and abstract thinking skills were expressed among the deficiencies observed in students:

> "Students should choose the computer science department knowing basic math. They should have a good command of four operations skills and logic. They should be able to reason. They should have a good command of the Turkish language structure because we mention programming, coding. These are all related to how accurately we understand and express Turkish." (P5).

The theme with the highest number of opinions on student needs was found as the computer theme. In addition to insufficiencies in basic computer knowledge, software, hardware, and computer literacy, it was stated that students were unable to install operating systems. Teachers also stated that office programs must be learned and drew attention to robotic coding and block coding. Some of the teachers also asserted that students lacked awareness in the field of information technology. Unawareness of the need for the field, making unconscious field preferences, and unconscious use of social media are the prominent sub-themes in the awareness theme:

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"…There are too many shortcomings of our students in using basic computer technologies..." (P2).

"…They also need to learn computer literacy..." (P4).

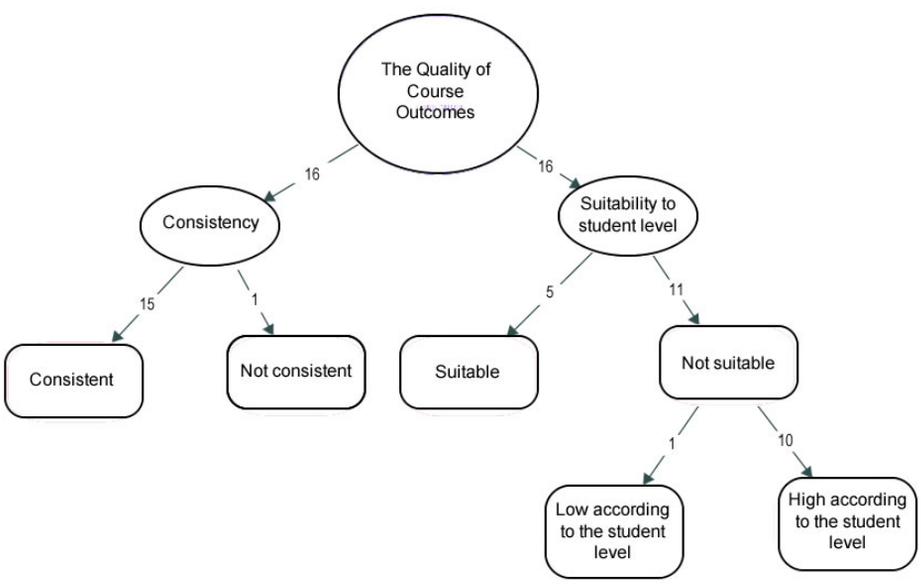
"Our students do not make conscious choices related to the information world. Students say that I could not settle in any department. I had enough scores for vocational upper secondary school. That is why I chose this department. Therefore, students need to raise awareness." (P5).

While most teachers (n:11) stated that the current curriculum framework is sufficient to meet the needs of students, some teachers find the curriculum insufficient (n:3) and partially sufficient (n:2).

The Quality of Course Learning Outcomes

Opinions on the quality of the course learning outcomes in the curriculum framework are presented in Figure 2.

Figure 2
The Quality of Course Learning Outcomes



The quality of the course learning outcomes was expressed under two themes: Consistency and suitability to student level. Most teachers stated that the learning outcomes were consistent. In terms of suitability for the student level, most teachers pointed out that the curriculum learning outcomes were high according to the student level:

"I think the learning outcomes are suitable. Because there is a curriculum that goes from simple to complex. When we look at it, I think examples and explanations are sufficient." (P1).

"I do not think that the learning outcomes are sufficient in terms of implementation. There are many high-level learning outcomes." (P2).

"The learning outcomes are far above the student level, but there is no problem with the curriculum framework. The main problem stems from the lack of students choosing this department." (P8).

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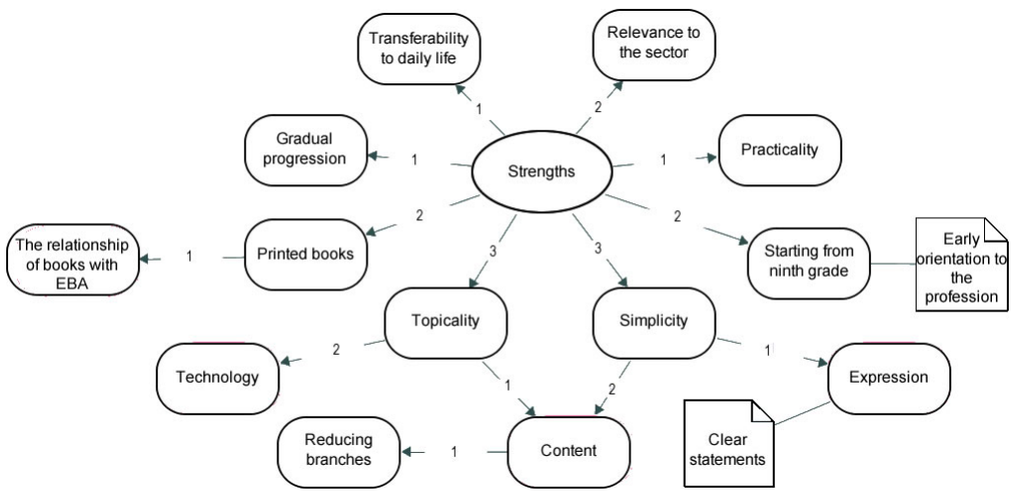
Strengths of Curriculum Framework

Opinions on the strengths of the Curriculum Framework are offered in Figure 3.

Figure 3
Strengths of Curriculum Framework



The strengths of the curriculum framework are transferability to daily life, relevance to the sector, practicality, starting from ninth grade, simplicity, topicality, printed books, and gradual progression. The simplicity of the curriculum was expressed depending on the clear statements and the simplicity of the content:

> "It is simple compared to the previous curriculum. In the previous curriculum, they tried to give too many topics at the same time. Now, a simpler and more targeted framework curriculum has been defined. It is a curriculum that is also suitable for the sector and today." (P8).

In terms of content, reducing branches was seen as a strength. The topicality of the curriculum is expressed through technology and content sub-themes. The orientation to the profession starting from the ninth grade was also evaluated as a strength.

> "As I said in the previous curriculum, there were old technologies, but in the new framework curriculum, current technologies were discussed..." (P9).

> "The strengths of the curriculum are that it starts from the ninth grade and the course contents are updated. Course contents are prepared in accordance with today's conditions...I think the transition from modular system to book system is also a strength." (P16).

Aspects of Curriculum Framework That Are Open to Improvement

The opinions on the aspects of the curriculum framework that are open to improvement are offered in Figure 4.

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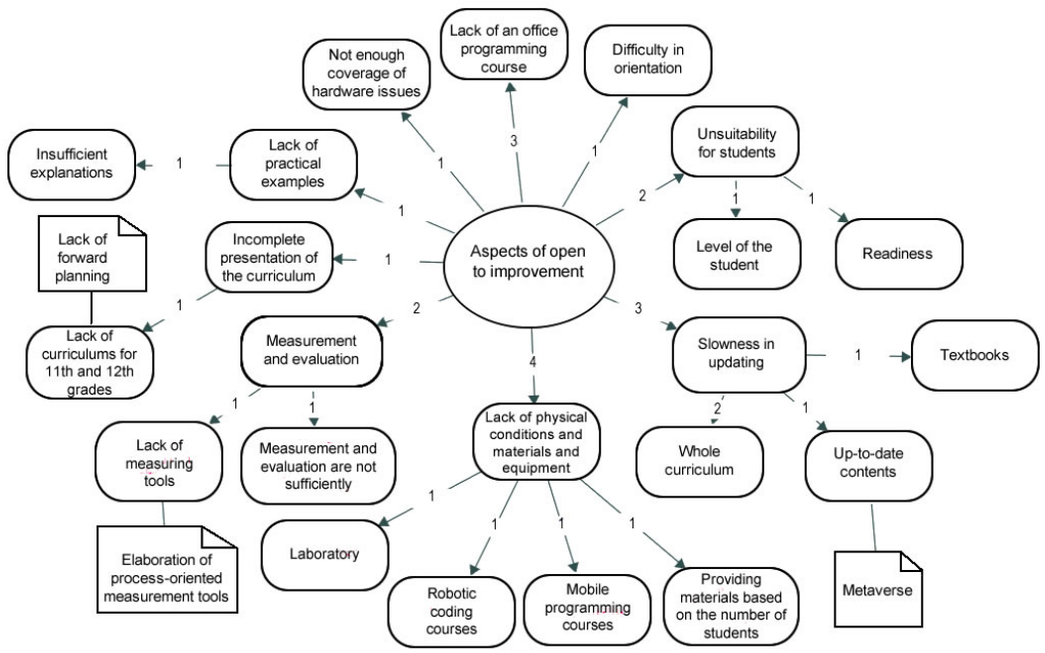
Figure 4
Aspects of Curriculum Framework That Are Open to Improvement



The aspects of the curriculum framework that are open to improvement are the lack of an office programming course, difficulty in orientation, unsuitability for students, slowness in updating, lack of physical conditions and materials and equipment, measurement and evaluation, incomplete presentation of the curriculum, lack of practical examples and not enough coverage of hardware issues. One teacher expressed his/her opinion regarding the lack of an office programming course as follows:

> "There was an office programming course in the previous curriculum. And here, there is none. This course could have been added somewhere. Students need to learn Word or Excel. At least as a subject, it should have been included in a certain course. It seemed incomplete to me in that respect." (P 7).

The fact that the curriculum is unsuitable for students is addressed in terms of the curriculum being above the level of the student and the low level of readiness of the students:

> "For example, we teach robotic coding in tenth grade. The student is taking this lesson without knowing basic electronic information. In other words, the level of readiness is very low in this course. They are introduced to this course without prior knowledge." (P10).

> "The curriculum is heavy for the student potential. It needs to be eased." (P15).

The teachers, stating that the curricula in the field of IT should be updated much faster than in other fields, mentioned the inclusion of up-to-date content (such as metaverse) and continuous updating of textbooks:

> "Textbooks need to be updated a little more rapidly against current technologies and information. For instance, when I became a teacher, I taught the books I read in upper secondary school based on modular system to students here" (P6).

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The most frequently mentioned aspects open to improvement were physical conditions and lack of materials and equipment. In this theme, it was stated that laboratories were insufficient and there were problems in providing materials based on the number of students. On the basis of courses, it was also stated that there was a lack of materials and equipment in robotic coding and mobile programming courses.

> "We have material problems and lack of computers when it comes to the mobile programming course." (P14).

> "There can be a shortage of laboratories at our school. Physical conditions may not be suitable in some applications." (P11).

In the measurement and evaluation theme, the fact that measurement and evaluation are not sufficiently included in the whole curriculum and that measurement tools are presented incompletely were considered aspects open to improvement. Especially, the lack of elaboration of process-oriented measurement tools was criticised:

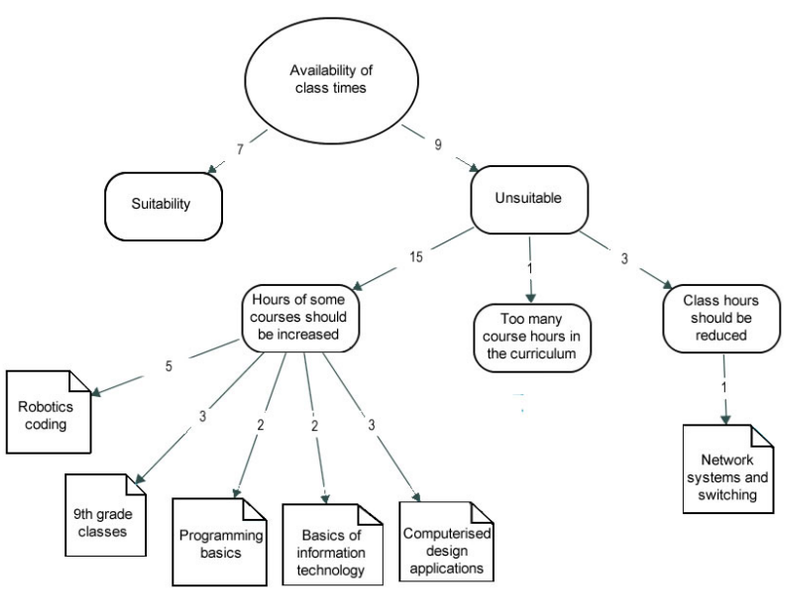
> "The measurement and evaluation part of the curriculum is very short. Performance-based evaluation is not mentioned much. We need to use more process-oriented evaluations in IT courses like analytical rubric, rating scale and checklist for evaluating psychomotor skills. These should have been addressed in more detail in the curriculum. It seems that the scope is a little narrow in this respect." (P2).

Findings Related to the Input Dimension

Availability of Class Times

Opinions regarding the availability of course hours in the curriculum framework are presented in Figure 5.

Figure 5
Availability of Class Times



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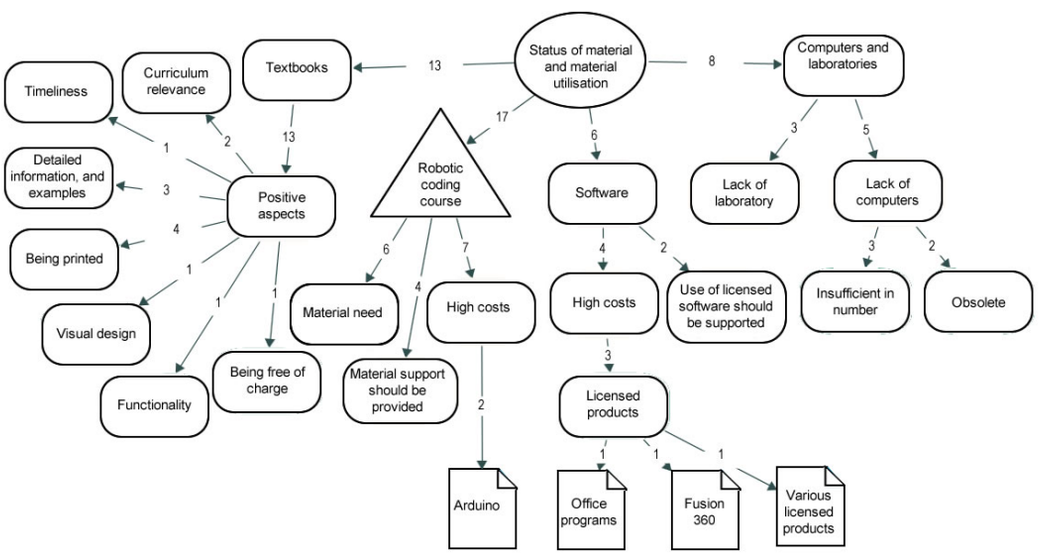
Teachers' opinions on the suitability of the course hours were grouped under two themes: suitable and unsuitable. Many of the teachers, having the opinion of "unsuitable" believed that the hours of some courses should be increased. While one teacher found the total number of hours in the curriculum too high, there were also opinions that the course hours should be reduced.

Material and Equipment Use

Opinions on the use of materials and equipment in the implementation process of the curriculum framework are provided in Figure 6.

Figure 6
Status of Material and Material Utilisation



Opinions on the use of materials and equipment were expressed in four themes: Textbooks, robotic coding course, software and computers and laboratories. When talking about the use of materials and equipment, the robotic coding course was mostly mentioned. In this course, it was stated that materials were needed and therefore, material support should be provided. It was also claimed that the Arduino microcontroller card used in this course was costly. It was also asserted that not only Arduino but also some software products used in the field were costly. In this matter, support for the use of licensed software was requested:

> "We really need materials for our robotic coding lesson. These definitely need to be kept up to date. For others, our computer laboratories are already enough." (P5).

Positive opinions were expressed on the use of textbooks as materials. Positive opinions consist of the categories of curriculum relevance, timeliness, functionality, detailed information, and examples, being printed, visual design and being free of charge. On the one hand, teachers stating that the laboratories were insufficient drew attention to the fact that the computers were both insufficient in number and they were old.

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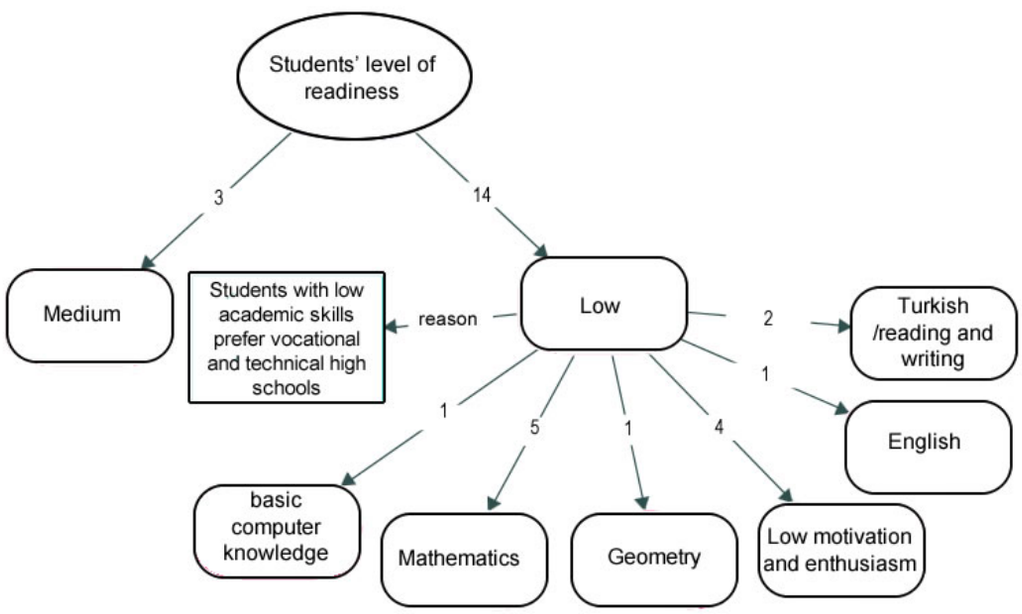
Students' Level of Readiness

The opinions on students' level of readiness for the curriculum framework are available in Figure 7.

Figure 7
Students' Level of Readiness on Curriculum Framework



Teachers characterised students' readiness as medium and low. Opinions that the level of readiness is low have gained momentum. In addition to basic computer knowledge, insufficiencies in mathematics, geometry, English and Turkish (reading and writing) language courses were reported to affect the level of readiness. Students' low motivation and enthusiasm were also addressed as factors affecting readiness. Teachers associated the preference of students who have low academic achievement for vocational and technical upper secondary schools with low readiness:

> "The readiness of our students is not enough. We are trying to adapt the curriculum a bit more to the student. We have such a problem, yet the learning outcome cannot be fully realised." (P4).

> "When the student comes from middle school to upper secondary school, we can have a lot of challenges because of the fact that he/she is weak in the field of mathematics." (P9).

Findings Related to the Process Dimension

Teaching Methods, Approaches and Techniques

The teaching methods, approaches, and techniques used by the teachers while implementing the curriculum framework are available in Figure 8.

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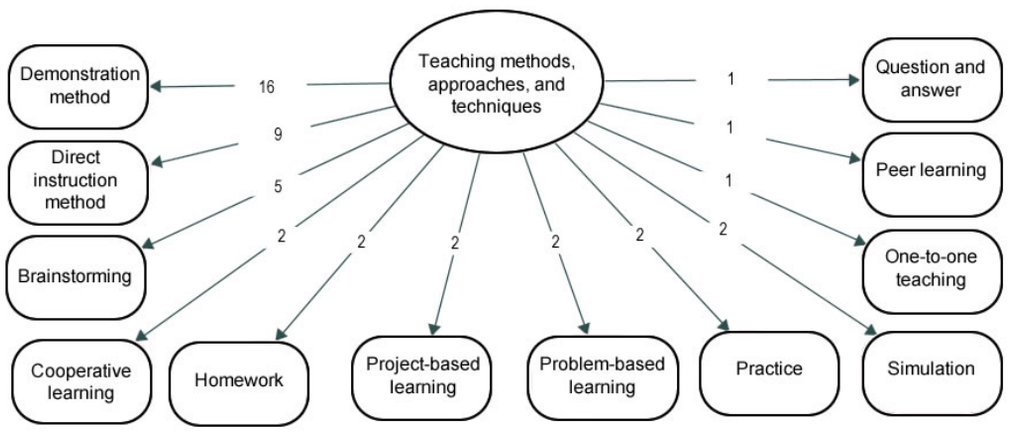
Figure 8
Teaching Methods and Approaches and Techniques



Teachers specified that they mostly used the demonstration method owing to the nature of their field. This was followed by the direct instruction method. It was also stated that these two methods were usually used together. These were followed by brainstorming, cooperative learning, homework, project-based learning, problem-based learning, practice, simulation, one-to-one teaching, peer learning and question and answer:

> "We are basically project-based. When it is project-based, lecture, question and answer, demonstration, brainstorming in teamwork are all there." (P3).

> "This is the demonstration technique that we use especially in our courses. The reason for this is reinforcement. That is to say, we provide information first, then show how it is done, and finally make the student do it." (P6).

Problems Encountered in The Process

The problems encountered by teachers while implementing the curriculum framework are available in Figure 9.

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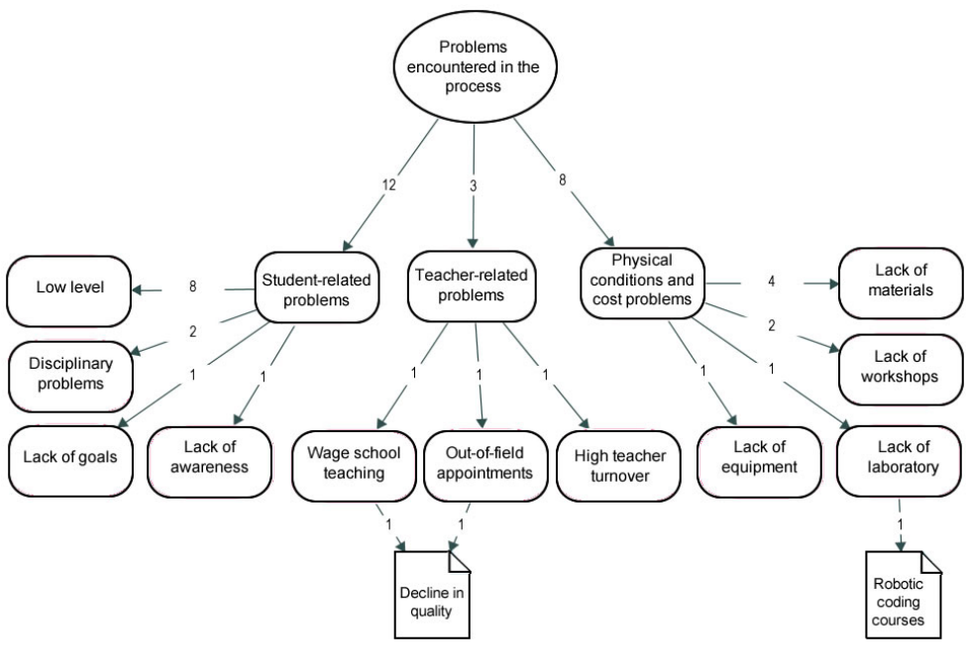
Figure 9
Problems Encountered in the Process



The problems encountered by teachers in the process were categorised under three themes: Student-related problems, teacher-related problems and physical conditions and cost problems. Student-related problems were listed as low level of students, disciplinary problems, and students' lack of awareness and lack of goals:

> "There are no problems in the curriculum framework. The curriculum is good if the ideal student comes. But we cannot provide what we want because there are students who have absolutely no goals and only want to have a diploma in their hands." (P8).

Paid teaching practice, out-of-field appointments, and high teacher turnover were expressed as teacher-related problems. It was assumed that these problems reduced teacher quality:

> "One of the most common problems we face is the high teacher turnover...There are also a lot of paid teachers in my region. The qualifications of these teachers are low." (P2).

According to the teachers, insufficient materials, workshops and equipment constituted an important problem. On the other hand, a teacher specified that the laboratories were insufficient for the robotic coding course:

> "The problem is not caused by the curriculum. We believe that the problem is caused by the lack of our workshops." (P10).

> "The problem I face is the lack of materials. Sometimes we try to solve this situation on our own, but since the cost usually depends on the government, it has to be solved by it." (P3).

Suggestions for Solutions to The Problems Encountered in The Process

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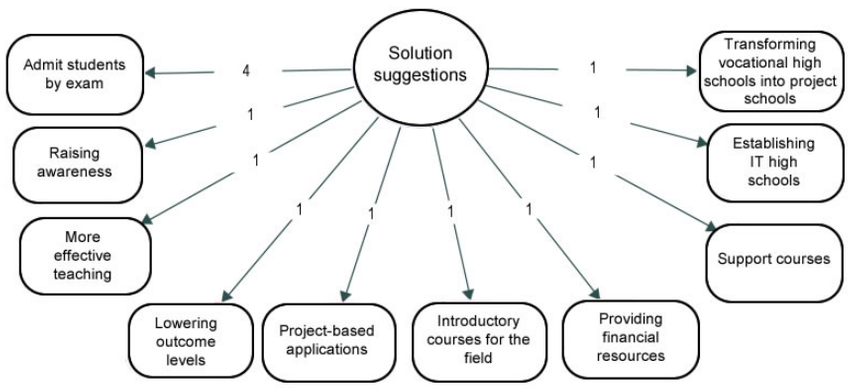
Teachers' suggestions to solve problems encountered in the process are provided in Figure 10.

Figure 10
Solution Suggestions



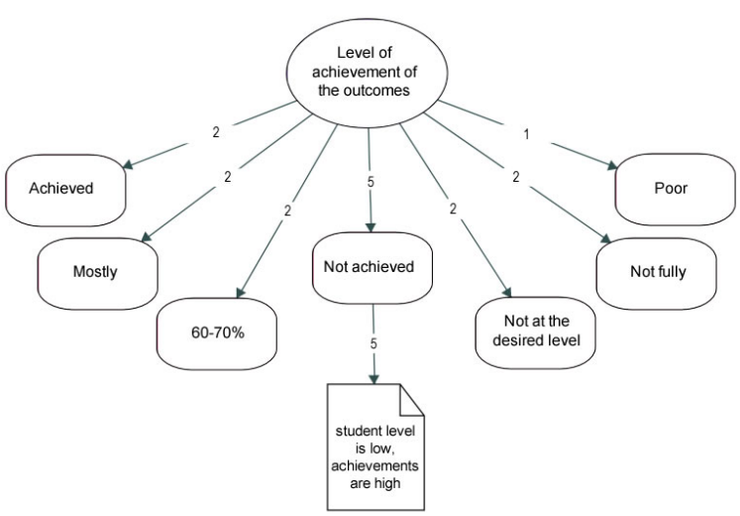
The solution most frequently suggested by teachers has been to admit students to vocational and technical upper secondary schools by exam. Other solution suggestions included raising awareness, more effective teaching, lowering learning outcome levels, project-based applications, introductory courses for the field, providing financial resources, support courses, establishing IT upper secondary schools and transforming vocational upper secondary schools into types of project schools.

Findings Related to Product Dimension

Level of Achievement of Learning Outcomes

Teachers' opinions on the level of achievement of the learning outcomes of the curriculum framework are addressed in Figure 11.

Figure. 11
Level of Achievement of Learning Outcomes



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Teachers used different expressions about the level of achievement of the learning outcomes (achieved, mostly, 60-70%, not achieved, not at the desired level, not fully, poor). Based on these statements, it can be interpreted that the level of achievement of the objectives is not sufficient in general.

Discussion

The fact that there are very few studies evaluating the framework curriculum in the field of information technologies, which started to be carried out in vocational and technical high schools in Turkey as of the 2020-2021 academic year, and the inability to go beyond document review within the scope of the accessible literature made it necessary to conduct this research. The general purpose of the research is to evaluate the information technologies field framework curriculum applied in vocational and technical upper secondary schools with the CIPP model. A qualitative approach was adopted, and the opinions of information technologies field teachers were consulted.

Students' deficiencies in the field of information technology were found to be related to basic courses and basic computer use. Among the basic subjects, mathematics was the most insufficient course for students. Apart from mathematics, students' insufficient readiness levels in Turkish, English languages and geometry were expressed. Though the curriculum framework was generally sufficient to respond to student needs, the opinions that students' readiness levels were low gained momentum. This situation has been described as a problem in implementing the curriculum framework. The strengths of the curriculum framework include its transferability to daily life, suitability for the sector, practicality, simplicity and timeliness, gradual progression, and early orientation to the profession starting from the ninth grade. Among the aspects of the curriculum framework that are open to improvement are the lack of an office programming course, difficulty in orientation, not being student-friendly, slow updating, lack of physical conditions, materials, and equipment, and deficiencies in measurement and evaluation. There are also opinions towards the suitability of the course hours in the curriculum framework or vice versa. Opinions on increasing the hours of some courses have gained momentum.

One of the most important problems experienced in the implementation of the curriculum framework was the lack of materials, workshops, and equipment. Teachers specified that laboratories were insufficient, and computers were missing. One of the problems experienced in implementing the curriculum framework is teacher-related difficulties. Teachers drew attention to the practice of paid teaching, out-of-field appointments, and high teacher turnover. The solution most frequently suggested by teachers for the problems they face while implementing the curriculum framework is to admit students to vocational and technical upper secondary schools through exams. Another suggestion based on the same logic is to transform vocational upper secondary schools into project schools. These recommendations are aimed at getting more qualified students to study at vocational and technical upper secondary schools. Other suggestions include raising awareness, lowering learning outcome levels, offering introductory courses, providing financial resources, and establishing IT upper secondary schools.

The obtained findings as a result of the research are in line with the results of similar studies. In Uysalı and Deryakulu's (2019) study, it was found that numerical competence level was a predictor variable in choosing professions in the field of information technology. In addition, Tamer and Özcan's (2014) research evaluating the formal vocational and technical education system found that students had insufficiencies in foreign language skills and the importance of foreign language learning in accessing information with the support of technology was highlighted. In Erol's (2019) research analysing the problems regarding the field of information technology in vocational and technical education, it was found that students had insufficient mathematics knowledge, lacked mathematics infrastructure, had logical comprehension

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problems, and had difficulty in reading comprehension. In the same study, teachers offered suggestions such as more qualified students choosing the field of information technology, student selection based on success ranking or exam, and the inclusion of practices that increase reasoning ability and analytical thinking in the courses. The result of Erol's (2019) research that most of the problems in the field of information technology are student based is also in line with the current research results. Demir and Cevahir (2020) also found that information technology students' algorithmic thinking and problem-solving skills were low. In Erol's (2019) research, the readiness levels of vocational upper secondary school students regarding information technology were found to be insufficient and as a result, it was determined that students were unsuccessful. In a study by Deperlioğlu et al. (2014), it was found that although the demand for vocational and technical upper secondary schools is low, there is a high interest in the field of information technology, and that rural area students who have low levels and cannot have enough scores to choose other upper secondary schools prefer vocational and technical upper secondary schools and naturally the knowledge and experience levels of the students are low. In Erol's (2019) research, similar results such as reluctance, lack of concern for the future, lack of self-improvement and dropping out of school were found. Based on the same study, it can be said that students' career choice mistakes and insufficient knowledge about the profession also support these results. In Şen Gürer's (2022) research, which can be indirectly related to these results, low motivation in students was expressed as an important problem. Tamer and Özcan's (2014) study concluded that necessary awareness-raising should be done at the point of choosing vocational education. The issue of gaining consciousness has also been mentioned in different studies. For instance, Eksioglu and Taspinar (2019) suggested that insufficient awareness-raising studies on vocational and technical education is one of the obstacles to the development of vocational and technical education. Engin and Gurses (2017) and Erol (2019) believed that seriously reconsidering counselling would be helpful. According to Deperlioglu et al. (2014), the importance of vocational education should be explained by increasing counselling services in secondary education. Likewise, Eksioglu and Taspinar (2019) assert that students are not provided with enough counselling and cannot be directed to curricula that are suitable for their interests and abilities, and therefore, students must make choices without knowing the professional fields too much. According to Adıgüzel and Berk (2009), vocational and technical upper secondary school students must be guided in line with their interests and abilities. To this aim, measures should be taken to increase the effectiveness of counselling and psychological counselling services.

Ongöz and Al Şensoy (2021) listed the spatial quality indicators an information technology classroom should have as equipment, infrastructure, materials and safety, installation, and spatial organisation. According to Deperlioğlu et al. (2014), the renovation of the workshops and laboratories of vocational upper secondary schools should not only be left to the state. It should also be supported by professional organisations and NGOs. Adıgüzel and Berk (2009) also suggested that it is challenging to cover all equipment expenditures in vocational and technical upper secondary schools from the state budget because of economic conditions. Besides, employers need to meet the increasing equipment needs. Similarly, Erol (2019) highlights the factor of insufficient infrastructure. Engin and Gürses (2017) also consider it necessary to provide easy access to computers in technical upper secondary schools and underline the importance of sufficient information technology laboratories. Regarding the slowness of updating, Deperlioğlu et al. (2014) suggest that vocational upper secondary schools cannot keep up with the developing technology and that the education sector lags far behind expectations in schools where teachers do not make extra efforts. In Parlakkılıç's (2014) study, the most discussed issues were the insufficiency of the curriculum and the need for updating it. Erçetin and Durak (2017) also referred to the completion of equipment deficiencies. Tamer and Özcan (2014) point out that as a national education policy, necessary arrangements should

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be made to improve the physical infrastructure and equipment of vocational schools. Şen Gürer (2022) also discussed equipment, infrastructure problems and lack of teaching materials. Likewise, Debreli (2009), Ergin (2008), Deperlioğlu et al. (2014), Arabacıoğlu (2013) and Adıgüzel and Berk (2009) drew attention to the same problems. Chen et al. (2023) mentioned the problems in the information technology program applied in vocational upper secondary schools in China as insufficient course hours and outdated content, lack of teaching staff and insufficient educational resources.

Ercetin and Durak's (2017) study found that information technology teachers mostly used instruction and demonstration methods. Regarding this issue, Pridmore et al. (2010) compared direct instruction with the case study method. The results of the study pointed out that direct instruction was more effective in terms of cognitive learning outcomes related to the understanding of IT concepts. On the other hand, the case study method was found to be effective in terms of practice-oriented behavioural learning outcomes.

While Ergin (2008) and Arabacıoğlu (2013) also touched on problems related to measurement and evaluation; Erçetin & Durak's (2017) study argues that insufficient course time was also considered a problem. In Erçetin & Durak's (2017) research, the lack of courses and workbooks was expressed as another problem. On one hand, teacher-related problems were also disclosed in Parlakkılıç's (2014) study. In this study, it was asserted that there are problems as to the personal rights of employees and that legal regulations are required.

The fact that there is no significant evaluation study on the investigated program can be considered a strength of the research to overcome the deficiency in this regard. The adoption of a qualitative approach can be regarded as an advantage in investigating the research topic in depth. Nonetheless, the fact that this approach refers to a process carried out with a small number of participants can also be expressed as a limitation of the research.

Conclusions

The results of the research indicated that the framework program could not be a solution to most of the problems in the previous programs. The results of the study were in connection with the results of similar studies. Even though older programs in the field of information technologies were investigated in similar studies, the results were close to one another. It is thought-provoking that the same problems are encountered during the application of the curricula and the aspects open to improvement overlap. In other words, though the curricula have changed, the problems experienced have not changed. This situation brings to mind the idea that other factors might be effective rather than the curriculum itself. In this context, it can be stated that student profile, infrastructure deficiencies and economic problems lie at the root of the problems in practice. Therefore, for the framework program to be effective, it seems important to create the financial resources required in the process. It is believed that it would be useful to address this determination together with the need for qualified teachers and students.

Even though most of the problems could not be solved with the curriculum framework, some of the negativities experienced in previous curricula were eliminated. This can be exemplified by the preparation of textbooks in line with the demands and introducing students to vocational courses at an earlier age.

This research has generally presented the current status of the curriculum framework in practice. The aspects of the curriculum framework that are open to improvement and its problems in practice have been disclosed. Thus, the results of this research can help to develop policies to overcome the shortcomings. On one hand, while the problems were frequently mentioned in the findings, the suggestions for solutions seemed more limited. The findings and results of this study can form the basis for future scientific studies focusing on solutions to these problems.

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Recommendations

Supportive training should be provided instead of lowering the curriculum learning outcomes to eliminate students' deficiencies in basic courses and to increase their readiness levels. The office programming course should be included in the curriculum framework again. Because of its structure, the information technology curriculum should be updated more frequently than the curricula of other fields. Support from the state and the private sector should be enhanced to improve physical conditions and overcome material and equipment deficiencies. To deal with teacher-related problems and improve teacher quality, the practice of paid teaching and out-of-field assignments in IT should be ended. IT curriculum framework can be evaluated with different curriculum evaluation models using quantitative research methods. Scientific studies can be performed to analyse the problems experienced in the curriculum framework and search for solutions.

Declaration of Interest

The authors declare no competing interest.

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Appendix: Structured Individual Interview Form

- What are your opinions on the information technology needs of your students and the suitability of the curriculum framework to meet these needs?
- What are your opinions on the quality of the course learning outcomes in the curriculum framework?
- What are your opinions on the strengths of Curriculum Framework?
- What are your opinions on the aspects of the curriculum framework that are open to improvement?
- What are your opinions on the suitability of course hours within the framework of the curriculum?
- What are your opinions on the use of materials and equipment in the implementation process of the curriculum framework?
- What are your opinions on students' level of readiness for the curriculum framework?
- Which teaching methods, approaches and techniques do you use when implementing the curriculum framework?
- What are the problems you encountered during the framework program implementation process?
- What are your solution suggestions for the problems you encountered in the process?
- What are your opinions on the level of achievement of the learning outcomes of the curriculum framework?

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