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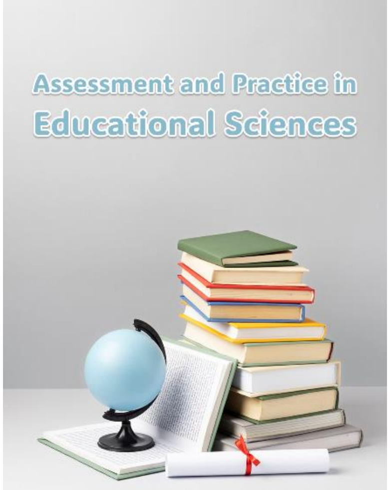

Developing a Tax Literacy Curriculum Model for Secondary Education

ABSTRACT

The present study aimed to develop a tax literacy curriculum model for secondary education. In terms of purpose, this was an applied study, and in terms of nature, it was qualitative and exploratory. To obtain an in-depth understanding of the dimensions and components of a tax literacy curriculum, the grounded theory method was employed using the systematic approach developed by Strauss and Corbin. The study participants consisted of experts in curriculum planning, educational sciences, secondary education, economics, public finance, accounting, and taxation. Participants were selected through purposive sampling supplemented by the snowball sampling method, and semi-structured interviews were ultimately conducted with 14 experts. The sampling process continued until theoretical saturation was achieved. The interview data were analyzed through the three stages of open, axial, and selective coding, and MAXQDA software was used for data management. During open coding, 388 initial concepts were extracted from the interview transcripts and classified into 42 open codes. During axial coding, these codes were organized into 18 categories and six paradigmatic groups: causal conditions, contextual conditions, intervening conditions, strategies, consequences, and the core category. The findings indicated that the core category of the tax literacy curriculum model was "educating responsible citizens and responsible entrepreneurs." The causal conditions included preventing corruption and tax evasion, understanding the nature and necessity of taxation, basic tax concepts, education about taxpayers' rights, and the economic and social objectives of taxation. The contextual conditions included tax ethics and financial conscience, the learning of values and ethics, and tax attitudes and culture. Tax calculation and analysis skills and familiarity with tax procedures were identified as intervening conditions. The principal strategies included using technology and practical experiences, empowering teachers, developing educational content, and emphasizing curriculum policymaking and planning. The consequences of implementing the model included improved decision-making and personal financial management and enhanced active and participatory learning among students. Accordingly, the proposed model can provide a foundation for designing tax literacy education programs within the secondary education system.

Keywords: tax literacy, curriculum, secondary education, grounded theory

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Introduction

Taxation is one of the principal instruments through which governments finance public services, redistribute resources, regulate economic activity, and support social and infrastructural development. Nevertheless, the effectiveness of a tax system depends not only on the design of tax laws and administrative procedures but also on citizens' knowledge, attitudes, ethical orientations, and willingness to comply. A tax system can function sustainably only when taxpayers understand why taxes are imposed, how tax revenues are used, what rights and obligations taxpayers possess, and how individual tax behavior affects collective welfare. In this regard, tax literacy has emerged as a multidimensional concept encompassing knowledge of tax principles, familiarity with tax procedures, the ability to interpret tax-related information, awareness of taxpayers' rights and obligations, and the development of responsible attitudes toward taxation. Tax literacy therefore extends beyond technical knowledge and includes behavioral, ethical, civic, and cultural dimensions that influence how individuals interact with tax institutions and perceive their role in financing society (1-3).

Tax literacy is closely related to financial literacy, because taxation constitutes an inseparable component of personal, occupational, and entrepreneurial financial decision-making. Individuals who earn income, purchase goods and services, establish businesses, save, invest, or engage in employment are directly or indirectly affected by taxation. Accordingly, tax knowledge should be viewed as a specialized domain within the broader framework of financial literacy. Financially literate individuals are expected to understand income, expenditure, saving, budgeting, risk, credit, investment, and long-term planning; however, these competencies remain incomplete when individuals lack an understanding of the tax consequences of their financial choices. Evidence indicates that financial education can improve not only financial knowledge but also downstream attitudes and behaviors, particularly when education is systematic, context-sensitive, and connected to practical decision-making (4, 5). Financial attitudes, financial strain, risk tolerance, and behavioral patterns also influence financial satisfaction and the quality of individual decision-making, demonstrating that financial learning involves affective and behavioral components in addition to knowledge acquisition (6, 7).

The growing complexity of contemporary economic life has increased the need for early and structured education in financial and tax matters. Young people encounter financial decisions at increasingly early ages through digital payments, online shopping, social media advertising, electronic banking, entrepreneurial activities, and family financial interactions. They are also exposed to large volumes of commercial and financial information, the quality of which varies considerably. Social media can improve access to financial content, but it can also transmit simplified, promotional, or misleading information. Studies examining Generation Z have shown that financial content disseminated through social media can influence financial literacy, while the effect of digital marketing and influencer-generated content often depends on information adoption and users' ability to evaluate information critically (8, 9). Consequently, formal education systems can no longer assume that students will acquire reliable financial and tax knowledge informally. Schools must provide structured opportunities through which students learn to distinguish accurate information from persuasive content, understand the consequences of financial decisions, and develop responsible economic behavior.

The digital transformation of financial systems has further intensified this educational necessity. Financial technologies have expanded access to financial services and created new opportunities for inclusion, especially in underserved communities, yet the benefits of such technologies depend substantially on digital literacy and users' ability to understand financial risks, terms, and regulatory requirements (10). At the same time, digital financial systems can create new vulnerabilities, including fraud, misuse of financial platforms, tax noncompliance, and money laundering. Research has highlighted the moderating role of financial regulation and financial literacy in reducing risks associated with financial technology and illicit financial practices (11). Therefore, tax literacy education for adolescents should not be limited to conventional definitions of taxation but should also prepare students to participate responsibly in digital economies, use electronic tax systems, interpret digital financial records, and recognize the legal and ethical implications of online financial transactions.

Adolescence is a particularly important developmental stage for tax literacy education because it is during this period that individuals begin to form relatively stable attitudes toward work, income, entrepreneurship, citizenship, law, and public institutions. Secondary school students are approaching entry into higher education, employment, vocational training, or self-employment, and many will soon encounter formal financial and tax responsibilities. If tax education is postponed until adulthood, individuals may enter economic life without sufficient knowledge of tax obligations, filing procedures, legal rights, or the social purpose of taxation. Early exposure to financial and tax concepts can normalize responsible financial behavior and reduce the perception that taxation is an obscure, punitive, or exclusively adult concern (12, 13). Financial education beginning in childhood and continuing progressively across educational levels can establish the conceptual and ethical foundations required for later financial independence and civic responsibility (14, 15).

The educational value of financial literacy has increasingly been recognized in school curricula. Research has emphasized the importance of teaching financial literacy in schools and its potential effects on students' knowledge, attitudes, decision-making skills, and preparedness for real-life economic challenges (16). Studies conducted in different educational contexts have proposed practical strategies for strengthening students' financial literacy through age-appropriate instruction, authentic activities, and the integration of financial topics into existing subjects (17). Educational games have also been introduced as useful tools for making abstract financial concepts more tangible, engaging, and understandable to students (18). These findings indicate that the effectiveness of financial and tax education depends not merely on whether such content is included in the curriculum, but also on how it is sequenced, taught, contextualized, and assessed.

Curriculum design is therefore central to the institutionalization of tax literacy. A curriculum does not consist solely of subject matter; it also includes educational objectives, learning experiences, instructional strategies, assessment methods, teacher competencies, learning resources, and implementation conditions. A tax literacy curriculum must clarify which concepts are appropriate for students at each developmental level, how tax knowledge should be connected to everyday life, and how cognitive learning can be integrated with ethical and civic education. Existing studies on financial literacy curriculum development have proposed models for elementary and lower secondary education, demonstrating the need for coherent frameworks that connect knowledge, skills, attitudes, and practical applications (19, 20). Research on the implementation of financial literacy curricula has also highlighted the importance of institutional support, teacher training, suitable educational materials, appropriate teaching methods, and coordination among relevant organizations (21).

In Iran, studies of school curricula have indicated that financial literacy content is often fragmented, implicit, or unevenly distributed across subjects and educational levels. A qualitative meta-analysis of research on financial literacy in Iranian school curricula showed that, despite growing academic attention, a comprehensive and operational curriculum framework remains necessary (22). Analyses of financial education in mathematics textbooks have similarly suggested that financial concepts may be presented without sufficient continuity, practical orientation, or integration with broader personal and social financial competencies (23). These limitations are particularly important in the area of taxation, because tax concepts are often treated as technical economic or legal topics rather than as essential elements of civic, financial, and entrepreneurial education. A curriculum model specifically designed for tax literacy can address this gap by organizing tax concepts progressively and linking them to students' daily experiences, future occupations, civic rights, and social responsibilities.

The importance of tax literacy is also evident from the perspective of tax culture and voluntary compliance. Tax compliance is influenced not only by enforcement and penalties but also by taxpayers' perceptions of fairness, trust in tax authorities, moral beliefs, and understanding of the tax system. Recent evidence indicates that financial literacy and perceived fairness can shape tax compliance behavior, with trust in tax authorities functioning as an important mediating mechanism (24). Models of tax relations similarly emphasize that improving tax culture and taxpayer discipline contributes to sustainable development by strengthening cooperation between citizens and public institutions (25). In this sense, tax literacy education can contribute to long-term compliance by helping students understand the relationship among public revenue, public expenditure, social justice, accountability, and national development.

Tax culture is constructed through family beliefs, social experiences, public discourse, institutional behavior, and education. Negative attitudes toward taxation may develop when citizens perceive tax laws as complex, tax administration as unfair, public spending as nontransparent, or tax burdens as unequally distributed. Studies on determinants of tax culture have therefore underscored the significance of public awareness, institutional trust, transparency, justice, and educational initiatives in shaping positive attitudes toward taxation (26). Tax avoidance and noncompliance may also be associated with organizational governance, financial incentives, and the perceived effectiveness of regulatory systems (27). Although school education cannot independently resolve structural problems within tax systems, it can equip future taxpayers with the knowledge and critical capacity required to understand taxation, demand transparency, exercise legal rights, and distinguish between legitimate tax planning and unlawful tax evasion.

The legal complexity of taxation further supports the need for systematic education. Tax laws involve specialized terminology, interpretive principles, procedural rules, exemptions, obligations, and mechanisms for objection and appeal. Without basic legal literacy, citizens may fail to comply because of misunderstanding, depend excessively on intermediaries, or become unable to protect their rights. The principles and rules governing the interpretation of tax laws illustrate the need to understand not only statutory provisions but also the logic and methods through which tax rules are applied (28). Tax accounting similarly requires familiarity with principles, regulations, reporting systems, and differences across tax structures, all of which present challenges for individuals and organizations (29). A school curriculum should not attempt to teach adolescents the full technical complexity of tax law or tax accounting; rather, it should establish foundational competencies, such as understanding common taxes, recognizing taxable activities, identifying basic records, knowing where to obtain reliable information, and understanding fundamental taxpayer rights.

Tax literacy also has direct relevance to entrepreneurship. Students who later establish businesses must understand the relationship among income, costs, bookkeeping, financial reporting, taxation, and legal compliance. Financial literacy and entrepreneurial orientation have been associated with the performance of small and medium-sized enterprises, suggesting that entrepreneurs' financial competencies affect planning, resource allocation, and business sustainability (30). Reviews of the literature similarly indicate that financial literacy contributes to the performance and resilience of small and medium-sized enterprises by improving financial decision-making, access to finance, risk management, and operational control (31). Therefore, secondary education should prepare students not only to become responsible taxpayers as employees and consumers but also to become responsible entrepreneurs who understand that tax compliance is part of legitimate and sustainable business activity.

The relationship between financial literacy and responsible behavior is not purely cognitive. Emotional intelligence, moral values, financial attitudes, and self-regulation can mediate or shape the translation of knowledge into action. Research among upper-secondary students has shown that financial literacy can influence financial behavior through emotional and moral mechanisms (32). Students may understand the correct financial choice yet fail to act accordingly because of impulsivity, social pressure, short-term preferences, or weak ethical commitment. Curriculum design must therefore incorporate opportunities for reflection, discussion, problem-solving, role-playing, and value clarification. Tax literacy education should help students examine issues such as fairness, collective responsibility, tax evasion, corruption, public accountability, and the ethical dimensions of economic participation.

Practical and technology-supported teaching methods can strengthen this process. Experimental research has shown that TikTok and other familiar digital media can be used to teach tax literacy to students, especially when instructional content is concise, accessible, and aligned with learners' media habits (33). However, digital instruction should be accompanied by critical media literacy to prevent students from accepting inaccurate or oversimplified content. Project-based activities, simulations, hypothetical tax returns, classroom businesses, budgeting exercises, case studies, and visits to tax offices can make tax concepts more concrete. Such strategies are consistent with broader evidence that experiential and participatory financial education is more likely to influence behavior than decontextualized theoretical instruction.

The need for robust financial education became even more apparent during periods of economic disruption. The socioeconomic consequences of the COVID-19 pandemic demonstrated how income shocks, business closures, unemployment, fiscal interventions, and public financial support can rapidly affect households and enterprises (34). Such crises reveal the importance of understanding public finance, taxation, government expenditure, emergency support programs, and household financial resilience. They also show that financial vulnerability is shaped by both personal capabilities and macroeconomic conditions. Tax literacy can therefore help students understand how public revenues support crisis responses and why tax systems are connected to social protection, economic stabilization, and public welfare.

Tax policy also has distributive consequences that affect households differently. Changes in corporate tax rates can influence welfare, consumption, prices, employment, and the allocation of resources across urban and rural populations (35). Although such macroeconomic relationships may be complex, secondary students can be introduced to the basic idea that taxation affects not only government revenue but also social equity, economic incentives, and household welfare. This understanding can prevent tax education from being reduced to procedural compliance and instead position it within a broader framework of economic citizenship.

Assessing young people's financial literacy across national contexts has revealed continuing gaps in knowledge and preparedness. Research on young people in Latvia, for example, has highlighted the need to evaluate financial competencies in relation to changing economic and digital conditions (36). Similar concerns have been raised in studies of students and young adults in other countries, where tax awareness, tax literacy, and tax morale are often uneven and influenced by education, experience, and social context (3). These findings suggest that tax literacy should not be presumed to develop automatically with age. It requires deliberate curricular planning, repeated exposure, age-appropriate progression, and opportunities for application.

Previous models of financial literacy education in Iran provide a valuable foundation but do not fully address the specific structure of tax literacy at the secondary level. Grounded theory research has already been used to develop a financial literacy education model in Iran, indicating the suitability of qualitative approaches for identifying culturally relevant dimensions, implementation requirements, and educational strategies (37). Nevertheless, tax literacy includes specialized legal, ethical, administrative, and civic components that warrant separate investigation. A dedicated model should clarify the causal and contextual conditions that make tax education necessary, the central educational phenomenon around which the curriculum should be organized, the intervening conditions that facilitate or hinder implementation, the strategies required for effective instruction, and the expected individual and social outcomes.

The literature also demonstrates that isolated instructional activities are insufficient unless they are supported by educational policy, teacher preparation, institutional cooperation, and suitable resources. Teachers may lack tax knowledge, confidence, or access to standardized materials. Curricula may already be overloaded, and tax concepts may be perceived as overly technical or politically sensitive. These challenges require coordination among ministries of education, tax authorities, curriculum specialists, economists, accountants, and teachers. An effective model must therefore address both curriculum content and the organizational conditions required for implementation. It should also accommodate different academic tracks, student abilities, regional contexts, and levels of prior knowledge.

A comprehensive tax literacy curriculum can contribute to several interrelated outcomes. At the individual level, it can strengthen personal financial management, informed decision-making, budgeting, planning, and preparation for employment or entrepreneurship. At the educational level, it can foster active, collaborative, project-based, and problem-oriented learning. At the civic level, it can promote responsibility, legal awareness, social participation, and critical understanding of public finance. At the institutional level, it can support tax culture, trust, transparency, and voluntary compliance. At the societal level, it can contribute to reducing tax evasion, strengthening public accountability, and developing citizens who recognize both their rights and obligations within the fiscal system.

Despite the growing body of research on financial literacy, youth financial behavior, tax culture, and tax education, there remains a need for an integrated and empirically grounded curriculum model specifically designed for secondary education. Existing research addresses important components, including school financial education, curriculum models, tax literacy definitions, digital learning, financial behavior, entrepreneurship, compliance, and tax culture, but these elements have not yet been sufficiently integrated into a unified paradigmatic framework for secondary school tax literacy. Such a framework should be developed from expert knowledge and contextual evidence so that it reflects educational realities, tax-system requirements, learner needs, and implementation constraints.

Therefore, the present study aimed to develop a grounded theory-based tax literacy curriculum model for secondary education.

Methods and Materials

The present study was conducted to develop a tax literacy curriculum model for secondary education and is classified as applied research in terms of its purpose, as its findings can be used to design and improve educational programs related to tax literacy within the formal education system. In terms of its nature and method of implementation, the study was qualitative and exploratory because it sought to identify the dimensions, components, and indicators of a tax literacy curriculum model through field data and expert perspectives and to derive a conceptual model of this field from empirical data.

To obtain an in-depth understanding of the phenomenon under investigation and to extract the concepts and relationships among them, the grounded theory method was employed using the systematic approach of Strauss and Corbin. This method makes it possible to derive concepts and categories related to the tax literacy curriculum from empirical data and specialists' perspectives and to organize them within a coherent model. Under this approach, data collection and analysis are conducted simultaneously, and through constant comparison, the researcher gradually develops the concepts and categories and elevates them to a theoretical level.

The study participants consisted of experts and specialists in curriculum planning, educational sciences, secondary education, economics, public finance, accounting, and taxation. The inclusion criteria were possessing specialized knowledge and having academic or professional experience related to tax literacy, curriculum planning, or the teaching of financial and economic concepts. Sampling began purposively, and the snowball sampling method was subsequently used to identify additional qualified participants. During this process, semi-structured interviews were conducted with 14 experts. The number of participants was not predetermined; rather, sampling continued until theoretical saturation was achieved. Following the fourteenth interview, the responses became repetitive, and the new data did not add any new concepts or categories to the findings. Therefore, the interview process was terminated.

Table 1. Demographic Characteristics of the Experts

Expert	Gender	Age	Education	Occupation	Marital Status	Work Experience (Years)
1	Male	42	Doctorate	Teacher and university instructor	Married	13

2	Male	41	Master’s degree	Teacher	Married	18
3	Female	39	Master’s degree	Teacher and university instructor	Single	12
4	Male	48	Master’s degree	Teacher and university instructor	Married	23
5	Male	45	Doctorate	Teacher and university instructor	Married	17
6	Female	44	Doctorate	Teacher and university instructor	Single	16
7	Female	40	Master’s degree	Teacher and university instructor	Teacher	14
8	Male	41	Master’s degree	Teacher and university instructor	Married	11
9	Male	43	Doctorate	Teacher and university instructor	Married	19
10	Male	42	Master’s degree	Teacher	Married	10
11	Male	61	Doctorate	Teacher and university instructor	Married	34
12	Male	63	Master’s degree	Teacher and university instructor	Married	33
13	Female	45	Doctorate	Teacher and university instructor	Married	15
14	Male	39	Master’s degree	Teacher	Married	17

The data collection instrument used in this study was a semi-structured interview. This type of interview allows participants to express their perspectives and experiences freely and in depth while maintaining an overall framework for the questions. The interview questions focused on different dimensions of the tax literacy curriculum and addressed such issues as the necessity of tax literacy education in schools, the expected objectives of such education, appropriate content for secondary school students, teaching–learning methods, assessment methods, the teacher’s role, implementation contexts and requirements, and the expected consequences of implementing a tax literacy curriculum. The interviews were conducted after obtaining the participants’ informed consent and were recorded with their permission and subsequently transcribed in full.

Data analysis was conducted according to the three coding stages of grounded theory. During open coding, the interview transcripts were examined closely, and initial concepts related to the research topic were extracted. At this stage, the meaning units contained in the data were identified and labeled, resulting in the formation of initial codes. During axial coding, the concepts and categories obtained in the previous stage were compared, and the relationships among them were examined. At this stage, the categories were organized into a coherent framework, and the relationships among the influencing factors, contextual conditions, strategies, and consequences were identified. During selective coding, the principal categories were integrated around the central category, thereby forming the conceptual model of the secondary education tax literacy curriculum. This process enabled the researcher to explain the final structure of the model on the basis of the interview data and the relationships among the categories.

MAXQDA software was used to manage and organize the qualitative data and facilitate the coding process. This software enables the classification of data, the creation and revision of codes, the comparison of concepts, and the visualization of relational networks among categories, thereby helping the researcher conduct the data analysis systematically and accurately.

To ensure the credibility and trustworthiness of the findings, strategies such as member checking by selected participants, expert review of the codes and categories by curriculum planning specialists, and detailed documentation of the data collection and analysis procedures were employed. In addition, a portion of the data was examined by a second coder, and the level of intercoder agreement was calculated to ensure the reliability of the coding process. These measures helped ensure that the findings derived from the data analysis possessed the required accuracy and credibility and that the resulting model provided a valid representation of the dimensions and components of the tax literacy curriculum at the secondary education level.

Findings and Results

In the grounded theory method, data are analyzed through three stages: open coding, axial coding, and selective coding. Open coding is the initial stage of analysis, during which the qualitative data obtained from the interviews are examined line by line, and the concepts and meanings contained in the participants’ statements are extracted and labeled. At this stage, the researcher attempts to break the data into smaller meaning units, identify the initial concepts, and classify them according to their similarities and differences. Subsequently, during axial coding, the researcher establishes relationships among the resulting codes and organizes them into more coherent categories. At this stage, the relationships among the categories are identified according to the paradigmatic model of Strauss and Corbin, which includes causal conditions, the central phenomenon, contextual conditions, intervening conditions, strategies, and consequences. Finally, selective coding involves integrating and consolidating the categories. During this stage, the researcher focuses on the central category, organizes the other categories around it, and develops the theoretical narrative or conceptual model of the study.

The data in the present study were analyzed according to these stages. During open coding, the data obtained from the 14 semi-structured interviews with experts were examined closely, and the analysis of the interview transcripts resulted in the extraction of 388 initial concepts.

During the open-coding process, in addition to extracting concepts from the interview transcripts, selected statements made by the participants were considered to clarify the data analysis. For example, in Interview 3, one expert stated: "Tax literacy plays a very important role in students' civic education. When students know what taxation is and why taxes are paid, they better understand the role they have in society." The concepts of educating responsible citizens and awareness of the social role of taxation were extracted from this statement.

Similarly, in Interview 5, one participant stated: "When students become familiar with taxation at school, they understand that paying taxes is not merely a legal obligation but also a social responsibility." From this section of the interview, social responsibility and tax ethics were identified as initial concepts.

In Interview 7, one expert commented on the curriculum content as follows: "Tax literacy content for students should be simple and practical; in other words, it should cover matters that are useful to them in real life." The concepts of practicality and the relevance of educational content to students' everyday lives were extracted from this statement.

In Interview 9, one participant stated: "Students need to know exactly what taxation is and what role it plays in national development because, once they understand this, their attitudes toward taxation will change." The concepts of familiarity with taxation and its role in societal development were extracted from this section of the interview.

In addition, in Interview 11, one expert discussed the methods of teaching tax literacy as follows: "If tax education is presented only theoretically, it will not be very effective. It is better to teach it to students through real examples, group discussions, or practical activities." The concept of using active and participatory methods in tax literacy education was extracted from this statement.

Following constant comparison and an examination of conceptual similarities, these concepts were classified into 42 open codes. These codes covered topics such as educating responsible citizens, educating responsible entrepreneurs, familiarity with tax rights and obligations, tax ethics, promoting a tax culture, teaching basic tax concepts, tax calculation skills, using educational technology, developing educational content, empowering teachers, and the position of curriculum and policymaking.

Table 2. Open-Coding Process

Open Codes	Concepts Extracted From the Interview Transcripts
Educating responsible citizens	The role of tax literacy in civic and economic education; the role of tax literacy in civic and economic education; the importance of tax literacy in educating students; tax literacy as a pillar of civic education; educating responsible and tax-literate citizens; educating responsible citizens
Education for real life	Education for real life; entrepreneurship; social participation; responsibility
Educating responsible entrepreneurs	Educating responsible entrepreneurs who demand tax accountability
Increasing understanding of social roles	Increasing students' understanding of their social roles; increasing students' understanding of their social roles; increasing understanding of social roles; understanding taxation and responsible citizenship

Familiarity with tax rights and obligations	Familiarity with civic rights and obligations; familiarity with civic rights and obligations and financial participation; tax rights and obligations
Social participation and responsibility	Social participation and responsibility; participation in cultural, economic, and social activities; participation in national development; contributing to the administration of the country rather than merely making compulsory payments; strengthening social participation and responsibility through understanding the role of taxation in public services; strengthening civic identity and participation
Tax ethics	Paying taxes as a form of professional ethics; paying taxes as a form of professional ethics; tax ethics; strengthening tax ethics; cultivating tax ethics and responsibility
Law-abidingness and financial conscience	Law-abidingness and tax ethics; law-abidingness and tax ethics; financial conscience; financial responsibility and democratic citizenship
Learning values and ethics	Integrating tax knowledge with the cultivation of ethical values; learning values through practical experience
Financial transparency	Financial transparency as a value; financial transparency as a value
Corruption and preventing tax evasion	The existence of tax evasion; the adverse social consequences of tax evasion; the adverse social consequences of tax evasion; preventing tax evasion; preventing tax evasion through tax literacy education for students; inoculation against corruption; distrust and indifference; reducing social harm; distrust and indifference
Negative attitudes and social perceptions	Negative social attitudes toward taxation; negative attitudes toward taxation; negative societal attitudes; families' negative perceptions of taxation; cultural resistance and negative perceptions of taxation; viewing taxation as oppressive; lack of trust; negative attitudes toward taxation
Promoting a tax culture	The need to promote a tax culture; promoting a tax culture from an early age
The nature and necessity of taxation	Understanding the nature of taxation; understanding the nature and necessity of taxation; understanding the social necessity of taxation; understanding the reasons for and philosophy of taxation
Teaching basic tax concepts	Identifying different types of taxes; identifying common types of taxes; identifying common taxes; introducing types of taxes and their applications; teaching basic tax concepts; comprehensive instruction regarding the characteristics, structure, and basis of taxation; understanding the structure of the tax system and its relationship with the public budget
Tax calculation skills	Skills in performing simple tax calculations; skills in performing simple tax calculations; skills in analyzing and examining tax consequences; analyzing the adverse consequences of taxation; financial analysis skills; working with tax forms and systems
Tax procedures and tax returns	Familiarity with tax procedures; preparing tax returns and conducting financial analysis; familiarity with accounting, auditing, and balance sheets
Financial and social decision-making	Rational and ethical financial and social decision-making; rational financial and social decision-making; the influence of tax literacy on students' decision-making; influence on financial decision-making; influence on personal financial decision-making and social responsibility; avoiding high-risk financial behaviors
Personal financial management skills	Personal financial planning that accounts for tax obligations; financial management in everyday life; financial management knowledge and high efficiency; improving financial planning and management skills; expense management; striving for a suitable career future; income and expenditure; saving and setting future goals; budgeting and financial balance; goal setting and financial management; improving financial management despite low income; independence in life
Emotional control and financial discipline	Controlling impulsive purchasing; teaching patience in purchasing; financial discipline
Active and participatory learning	Active learning through practice; active learning; deep and participatory learning; increasing active participation in learning
Project-based learning	Project-based learning; project-based and game-based education; simulation of economic roles; authentic situated learning; field-based learning; games; simulations; group projects; interaction and deep learning; learning values through practical experience; problem-based learning
Use of educational technology	Use of educational technology; digital content; multimedia; online environments; producing videos and economic and tax-related content for online platforms
Use of specialists' experiences	Use of specialists' real-world experiences; use of specialists' experiences; inviting tax officials to parent–teacher meetings and school council meetings; inviting tax experts; connecting schools and society
Inadequately prepared teachers and insufficient training	Limited teacher competence; insufficient teacher knowledge and skills; absence of direct economic and tax literacy instruction in a separate textbook for all fields of study; absence of trained teachers; teachers' unfamiliarity with and limited background in economics
Educational and time constraints	Fear of judgment or politicization of the subject; excessive course content or challenges associated with incorporating tax literacy; curriculum time constraints; the complexity of tax concepts; the complexity of tax laws
Lack of educational resources	Lack of tax-related educational resources; lack of tax literacy educational resources; absence of educational resources specifically designed for students; absence of standardized and age-appropriate educational resources
Position of the curriculum and policymaking	Absence of an official position within the national curriculum; the necessity of using current and innovative methods and approaches; the importance of tax literacy as one of the literacies defined by UNESCO; incorporating tax literacy into existing textbooks on economics, family management, and humans and the environment; designing an independent "Tax Literacy and Economics" course for all fields of study; the necessity of allocating a course unit to students in the experimental sciences and mathematics tracks; addressing tax issues through supplementary programs when no separate course unit is allocated; integration into existing courses; presenting tax-related projects in textbooks

Development of educational content	Developing appropriate educational content; developing locally relevant and engaging educational content; producing engaging, localized, and multimedia content; using schools as centers for civic education; teacher education; interactive environments; diverse educational packages; scenario- and example-based content
Teacher empowerment	Empowering teachers; providing in-service teacher training; holding teacher empowerment courses; training curriculum planners to design the curriculum
Institutional cooperation and memoranda of understanding	Institutional lack of coordination; institutional cooperation; a memorandum of understanding between the Ministry of Education and the Tax Administration; developing a national educational framework in cooperation with relevant institutions; the necessity for the education system to remain open to cooperation with other organizations; coordination with the Ministry of Education's Cultural and Educational Affairs Division; tax–education cooperation; introducing tax literacy into education as a solution to existing challenges
Implementation solutions and recommendations	Holding educational workshops in schools or through education authorities; organizing an annual tax literacy conference; inviting tax experts; arranging student visits to tax offices; using awards and incentives and modeling initiatives on those implemented by institutions such as the police; learning from other organizations such as fire departments and recommending the participation of the Tax Administration; project-based education involving the design of a hypothetical business and its tax obligations; group activities and discussions concerning tax justice and citizens' roles; using educational games and digital simulations; using performance-based assessment instead of conventional examinations; practically and graphically demonstrating the effects of taxation on quality of life; displaying messages concerning the effects of taxation in schools; familiarizing students with taxation and having them report the information to their parents; awarding prizes for the best reports; holding weekly lectures and tax education sessions in schools delivered by officials
Participatory education and field visits	Visiting tax offices; authentic situated learning; field-based learning; graphically observing the effects of taxation on people's lives; interaction between schools and society
Use of games and simulations	Games; simulations; group projects; educational games and digital simulations; simulation of economic roles; the advantage of game-based education in making learning tangible and enjoyable
Effects of tax literacy on economic behavior	The influence of tax literacy on economic behavior; the development of responsible economic behavior; influence on personal financial decision-making and social responsibility; increased financial responsibility; the development of an informed and healthy society; cultivation of tax ethics and responsibility; strengthening social capital and economic participation
Effects of tax literacy on personal life	Improved decision-making skills; independence in life; personal financial management; controlling impulsive purchasing; teaching patience in purchasing; financial discipline; striving for a suitable career future; income and expenditure; saving and setting future goals; budgeting and financial balance; goal setting and financial management
Effects of tax literacy on society	Social and individual development; reduction of social harm; strengthening social participation and responsibility; an advanced, tax-oriented society; extensive cultural, financial, and social effects
Content and teaching methods	Simple and practical content; simplification of complex concepts; practical tax literacy content; relevance of content to everyday life; comprehensibility of tax concepts; use of practical examples in teaching; use of multimedia resources; locally relevant examples; interactive methods; flipped classrooms; case studies; scenario- and example-based content; integration of theoretical and practical content
Decision-making and critical-thinking skills	Critical thinking; tax-related problem-solving; development of critical thinking and tax budgeting; analysis of real examples of tax interactions; examination of the role of taxation in sustainable development and social justice
Economic and social objectives of taxation	Understanding the developmental role of taxation; understanding the revenue-generating function of taxation; understanding the application of taxation in occupations; the influence of taxation on social welfare; tax justice and the creation of a sense of belonging and solidarity; allocating the taxes collected in each city to that city; consulting citizens regarding tax expenditures
Education about taxpayers' rights	Awareness of tax rights and obligations; knowledge of the legal rights to object and access transparency; education concerning tax rights and obligations
Curriculum planning and design	The practical and progressive nature of the curriculum; the necessity of using active learning methods; integrating tax knowledge with the cultivation of ethical values; project-based learning, group activities, and role-playing; developing a national educational framework in cooperation with relevant institutions; developing a textbook for secondary education and organizing in-service courses for teachers; directly incorporating tax education into school textbooks; designing an independent "Tax Literacy and Economics" course

During axial coding, the extracted open codes were organized using the paradigmatic model of Strauss and Corbin and were classified into 18 categories and six paradigmatic groups. At this stage, categories such as tax ethics and financial conscience, the learning of values and ethics, and tax attitudes and culture were identified as contextual conditions. Categories including preventing corruption and tax evasion, the nature and necessity of taxation, basic concepts and types of taxes, education about taxpayers' rights, and the economic and social objectives of taxation were identified as causal conditions. Within this framework, the two categories of "educating responsible citizens" and "educating responsible entrepreneurs" were identified as the central phenomenon of the study, and the other categories acquired meaning in relation to them. In addition, categories such as using technology and practical experiences, teachers and educational development, policymaking and curriculum, and implementation solutions and actions were identified as the principal strategies. Tax calculation and analysis skills and familiarity with tax procedures and tax returns were regarded as intervening conditions. The consequences of this process included improved financial decision-making and personal financial management as well as enhanced active and participatory learning.

During selective coding, the extracted categories were integrated and organized around the central category to form the final framework of the tax literacy curriculum model. At this stage, the researcher integrated the findings from the preceding stages, explained the relationships of the causal, contextual, and intervening conditions with the strategies and consequences, and developed the conceptual model of the study. Ultimately, the data obtained from the interview analysis were organized into 42 indicators, 18 categories, and six paradigmatic groups. On this basis, the secondary education tax literacy curriculum model was explained with an emphasis on educating responsible citizens and responsible entrepreneurs.

Table 3. **Process of Transforming Initial Concepts Into Open, Axial, and Selective Codes**

Category Type	Axial Code	Open Code
Core category	Educating responsible citizens	Educating responsible citizens; education for real life
Core category	Educating responsible entrepreneurs	Educating responsible entrepreneurs who demand tax accountability; social participation and responsibility
Contextual	Tax ethics and financial conscience	Tax ethics; law-abidingness and financial conscience
Contextual	Learning values and ethics	Learning values and ethics; financial transparency
Contextual	Tax attitudes and culture	Promoting a tax culture; negative attitudes and social perceptions
Causal	Preventing corruption and tax evasion	Corruption and preventing tax evasion; adverse social consequences of tax evasion
Causal	Nature and necessity of taxation	Nature and necessity of taxation; understanding the reasons for and philosophy of taxation
Causal	Basic concepts and types of taxes	Teaching basic tax concepts; introducing types of taxes and their applications; identifying common types of taxes
Causal	Education about taxpayers’ rights	Education about taxpayers’ rights; knowledge of legal rights, including the right to object and the right to transparency
Causal	Economic and social objectives of taxation	Economic and social objectives of taxation; understanding the developmental role of taxation; the influence of taxation on social welfare
Intervening	Tax calculation and analysis skills	Skills in performing simple tax calculations; skills in analyzing and examining tax consequences; analyzing real examples of tax interactions
Intervening	Tax procedures and tax returns	Tax procedures and tax returns; familiarity with accounting, auditing, and balance sheets
Consequence	Decision-making and personal financial management	Financial and social decision-making; personal financial management skills; emotional control and financial discipline
Consequence	Active and participatory learning	Active and participatory learning; project-based learning; use of games and simulations
Strategy	Use of technology and practical experiences	Use of educational technology; use of specialists’ experiences; participatory education and field visits
Strategy	Teachers and educational development	Inadequately prepared teachers and insufficient training; teacher empowerment; development of educational content
Strategy	Policymaking and curriculum	Position of the curriculum and policymaking; curriculum planning and design; institutional cooperation and memoranda of understanding
Strategy	Implementation solutions and actions	Implementation solutions and recommendations; content and teaching methods

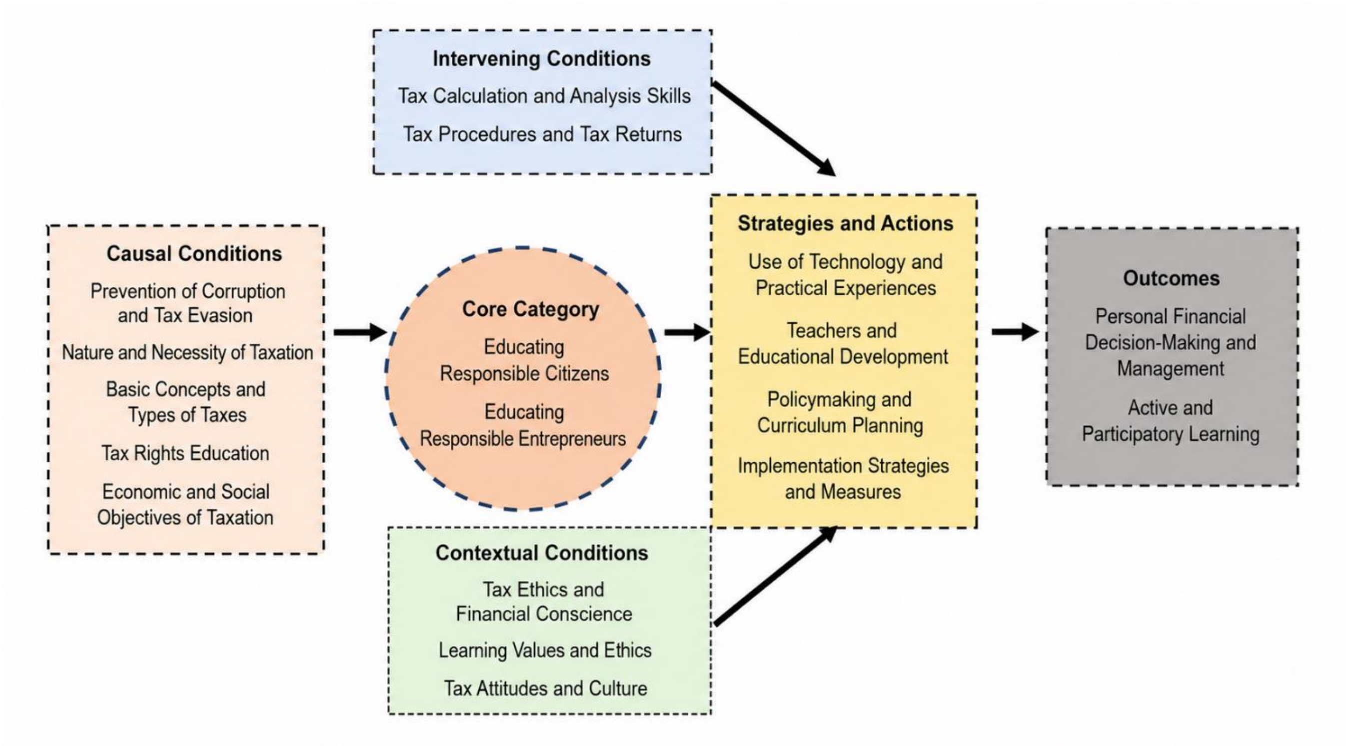

Figure 1. Paradigmatic Model of the Tax Literacy Curriculum for Secondary Education

Discussion and Conclusion

The present study aimed to develop a tax literacy curriculum model for secondary education using the systematic grounded theory approach. The findings organized 42 indicators into 18 categories and six paradigmatic dimensions comprising causal conditions, contextual conditions, intervening conditions, strategies, consequences, and the core category. The core category was conceptualized as "educating responsible citizens and responsible entrepreneurs." This finding indicates that tax literacy education should not be restricted to the transmission of technical information about tax rates, tax returns, or legal obligations. Rather, it should be designed as a multidimensional educational process through which students acquire financial knowledge, civic awareness, ethical responsibility, entrepreneurial preparedness, and the ability to participate constructively in economic and social life. This interpretation is consistent with the contemporary conceptualization of tax literacy as a combination of tax knowledge, practical competence, awareness of rights and obligations, attitudes toward taxation, and the capacity to make informed tax-related decisions (1, 2). It also accords with evidence suggesting that young adults' tax literacy, tax awareness, and tax morale are interconnected and should be cultivated before individuals assume full financial and legal responsibilities (3).

The identification of responsible citizenship as one dimension of the core category demonstrates that tax education has an essentially civic function. Students need to understand that taxation is not merely an administrative requirement imposed by the government but a mechanism through which citizens contribute to public services, infrastructure, education, healthcare, social protection, and national development. When students understand the social function of taxation, they may be more likely to perceive tax payment as a form of civic participation rather than as an involuntary financial loss. This result is compatible with studies emphasizing that tax culture, taxpayer discipline, and sustainable development depend on citizens' awareness of the relationship between tax contributions and collective welfare (25). It also supports research showing that the development of a positive tax culture is influenced by public awareness, institutional trust, transparency, and the perceived legitimacy of the tax system (26). Therefore, educating responsible citizens requires the integration of tax knowledge with public responsibility, legal awareness, accountability, and understanding of how tax revenues are connected to community development.

The second dimension of the core category, educating responsible entrepreneurs, reflects the importance of preparing students for future economic activity. Many secondary school students will eventually become self-employed individuals, business owners, managers, or participants in small and medium-sized enterprises. Entrepreneurial success requires more than creativity and market awareness; it also depends on bookkeeping, budgeting, financial reporting, regulatory compliance, and understanding tax obligations. The present findings therefore suggest that tax literacy should be incorporated into entrepreneurship education so that future business owners recognize tax compliance as a component of lawful, ethical, and sustainable enterprise management. This result is consistent with evidence that financial literacy and entrepreneurial orientation positively influence the performance of small and medium-sized enterprises (30). It is also aligned with reviews showing that financially literate entrepreneurs are better able to make strategic decisions, manage risks, allocate resources, and maintain business sustainability (31). Accordingly, the inclusion of entrepreneurial responsibility in the central phenomenon extends the function of tax literacy education from personal compliance to broader economic participation.

The causal conditions identified in the study included the prevention of corruption and tax evasion, understanding the nature and necessity of taxation, learning basic tax concepts and types, receiving education about taxpayers' rights, and understanding the economic and social objectives of taxation. These findings show that the need for a tax literacy curriculum arises from both educational deficiencies and broader social and economic challenges. Tax evasion and corruption can be reinforced by limited public knowledge, negative attitudes, distrust, and weak perceptions of responsibility. Introducing tax concepts during secondary education may help prevent the normalization of noncompliant behavior by establishing informed and ethical attitudes before students enter employment or business environments. This interpretation is supported by evidence indicating that financial literacy, perceived fairness, and trust in tax authorities affect tax compliance behavior (24). It is also consistent with research linking governance conditions and organizational conduct to tax avoidance, suggesting that tax behavior is shaped by knowledge, incentives, ethical judgment, and institutional context (27).

The identification of the nature and necessity of taxation as a causal category indicates that students must first understand why tax systems exist before they can meaningfully learn technical procedures. Teaching tax rules without explaining their social and economic rationale may produce superficial learning and reinforce the perception of taxation as an arbitrary burden. By contrast, instruction concerning the role of taxation in public budgeting, redistribution, infrastructure, and social welfare can create a coherent foundation for later learning. This interpretation corresponds with research showing that tax changes can affect household welfare, resource allocation, and the economic conditions of urban and rural populations (35). It also reflects the socioeconomic lessons of major crises, during which tax revenues and public expenditure become central to government support, economic stabilization, and social protection (34). Therefore, a tax literacy curriculum should connect abstract tax concepts to visible public outcomes and everyday social experiences.

Basic tax concepts and education about taxpayers' rights were also identified as causal conditions. This finding highlights the need to balance obligations with rights. Students should learn not only that taxes must be paid but also that taxpayers possess rights related to information, transparency, confidentiality, objection, appeal, and lawful treatment. Such knowledge can reduce dependence on informal sources, protect individuals from administrative misunderstanding, and encourage more informed interactions with tax institutions. The complexity of tax laws and the principles used in their interpretation confirms the need for foundational legal literacy (28). Similarly, the technical nature of tax accounting and the diversity of tax regulations demonstrate why citizens require structured and progressive preparation rather than incidental exposure (29). At the secondary level, this preparation should remain age-appropriate and focus on commonly encountered concepts, sources of reliable information, and fundamental procedural rights.

The contextual conditions comprised tax ethics and financial conscience, the learning of values and ethics, and tax attitudes and culture. These categories indicate that knowledge alone is insufficient to produce responsible tax behavior. Students may understand tax rules yet still disregard them if they lack ethical commitment, social responsibility, or trust in collective institutions. The findings therefore support the integration of moral reasoning, fairness, transparency, and public responsibility into the tax literacy curriculum. This result is aligned with research indicating that emotional intelligence and moral values mediate the relationship between financial literacy and financial behavior among upper-secondary students (32). It is also compatible with studies showing that financial attitudes influence emergency fund decisions and broader financial behavior (7). Consequently, tax literacy education should create opportunities for students to discuss ethical dilemmas, examine cases of tax evasion, evaluate issues of distributive justice, and reflect on the consequences of individual economic behavior for society.

The finding concerning tax attitudes and culture is particularly important because family narratives and social discourse may expose students to distrustful or negative views of taxation. A curriculum cannot fully eliminate these attitudes, especially when they are connected to perceived inequality or limited transparency, but it can enable students to examine them critically. Tax education should neither promote uncritical acceptance nor reinforce cynicism. Instead, it should teach students to distinguish legitimate criticism of fiscal policy from unlawful avoidance of tax obligations and to understand the importance of accountability on both sides of the citizen–government relationship. Previous research on the promotion of tax culture has similarly emphasized that education, transparency, trust, justice, and institutional performance jointly shape citizens' attitudes (26). The present study extends this perspective by identifying the school curriculum as an early setting for the formation of tax-related cultural orientations.

The intervening conditions included tax calculation and analysis skills and familiarity with tax procedures and tax returns. These findings suggest that the effectiveness of tax literacy education depends partly on whether students can transform conceptual knowledge into practical competence. Students should be able to perform simple calculations, interpret examples, recognize relevant financial documents, understand basic tax forms, and identify the steps involved in tax-related processes. Practical competence reduces the distance between school knowledge and real economic life. This result is consistent with broader evidence showing that financial education is more effective when it improves both knowledge and downstream behavior (4). Personal finance education has also been shown to influence students' financial knowledge, attitudes, and behavior, especially when learning activities are linked to realistic decisions (5). Thus, practical tax skills should be taught progressively through authentic and developmentally appropriate tasks.

The strategies identified in the model included the use of technology and practical experiences, teacher empowerment and educational development, curriculum policymaking, and implementation measures. The emphasis on technology is consistent with students' increasing engagement with digital media and financial platforms. Digital tools can facilitate simulations, interactive calculations, multimedia instruction, and access to current tax information. Experimental evidence has demonstrated that social media platforms such as TikTok can be used to improve tax literacy when educational content is appropriately designed (33). Research on financial content in social media also indicates that digital environments can influence Generation Z's financial literacy (8). However, because influencer marketing and digital content can also shape information adoption and consumption intentions, digital tax education should incorporate critical evaluation skills (9). Therefore, technology should function as an instructional medium rather than as an uncontrolled substitute for curriculum-based learning.

Practical experience was another major strategic component. Field visits, discussions with tax specialists, business simulations, hypothetical tax returns, educational games, and project-based learning can make tax concepts tangible and meaningful. This result corresponds with studies emphasizing the value of educational games and practical strategies in strengthening students' financial literacy (17, 18). It is also consistent with the development of age-appropriate financial education programs that use activity-based and experiential learning from early educational stages (14). In the context of secondary education, such methods can support collaborative learning, critical thinking, problem-solving, and the application of tax knowledge to realistic personal and entrepreneurial situations.

Teacher empowerment emerged as a central strategy because teachers are responsible for translating curriculum objectives into learning experiences. If teachers lack tax knowledge, instructional confidence, or appropriate resources, even a well-designed curriculum may be implemented superficially. The present finding aligns with studies of financial literacy curricula in Iran that have emphasized teacher preparation, educational resources, and institutional support as essential implementation requirements (21). It is also consistent with curriculum models developed for elementary and lower secondary education, which highlight the need for coherent content, professional development, and alignment among objectives, teaching methods, and assessment (19, 20). Analyses of Iranian school curricula and textbooks have further shown that financial education content is often fragmented, indicating that teachers require structured guidance and integrated materials (22, 23).

The strategy of curriculum policymaking and institutional cooperation indicates that tax literacy cannot be sustained through isolated classroom initiatives. Its implementation requires formal recognition within the curriculum, coordination between educational authorities and tax institutions, standardized learning outcomes, suitable materials, and adequate instructional time. This conclusion is consistent with grounded theory research proposing a financial literacy education model for Iran and emphasizing the importance of contextualized policy and systemic planning (37). It also accords with scholarship emphasizing the importance of financial literacy education in schools and the need to prepare students for increasingly complex economic conditions (12, 16). The development of financial literacy components from preschool through secondary education further suggests that tax literacy should be organized progressively rather than introduced as a single, disconnected unit (13, 15).

The identified consequences included improved decision-making and personal financial management and enhanced active and participatory learning. The first consequence indicates that tax literacy can affect students' broader financial capabilities. Understanding taxes can improve budgeting, income planning, saving decisions, employment choices, and entrepreneurial preparation. This result is aligned with research showing that financial knowledge, financial behavior, attitudes, risk tolerance, and financial strain are related to financial satisfaction and decision quality (6). It also corresponds with international evidence that young people continue to display uneven financial competencies, confirming the need for systematic education and assessment (36). The growing use of financial technology also makes the combination of financial, digital, and tax literacy increasingly important for effective and inclusive participation in modern financial systems (10, 11).

The second consequence, active and participatory learning, demonstrates that tax literacy can serve not only as educational content but also as a context for improving learning processes. Tax-related scenarios allow students to investigate real problems, work collaboratively, analyze evidence, debate questions of fairness, and make reasoned decisions. Such activities can transform taxation from an abstract legal topic into a meaningful interdisciplinary field connecting mathematics, economics, citizenship, ethics, technology, and entrepreneurship. Overall, the proposed model shows that a successful tax literacy curriculum should integrate conceptual knowledge, practical skills, civic responsibility, ethical reflection, digital competence, teacher preparation, and institutional support. Through this integrated structure, secondary education can prepare students for responsible participation in personal, occupational, entrepreneurial, and civic financial life.

This study had several limitations. The participants consisted of 14 experts selected purposively and through snowball sampling; therefore, the findings reflect the perspectives of a specialized group and may not fully represent the views of students, parents, teachers from different regions, tax administrators, business owners, or curriculum policymakers. The qualitative design was appropriate for model development but did not permit statistical testing of the relationships among the identified categories. The data were also based on self-reported expert perceptions and may have been affected by participants' disciplinary backgrounds and professional experiences. In addition, differences in regional economic conditions, school resources, educational tracks, and access to digital infrastructure were not examined separately. Finally, the proposed model was not implemented experimentally in schools, and its feasibility, effectiveness, and long-term educational consequences remain to be evaluated.

Future studies should quantitatively validate the proposed model by developing measurement instruments for its categories and testing the relationships among causal conditions, contextual conditions, intervening conditions, strategies, and outcomes. Researchers should include larger and more diverse samples of students, teachers, parents, tax experts, entrepreneurs, and educational policymakers from different geographical and socioeconomic contexts. Comparative studies could examine differences across academic tracks, public and private schools, urban and rural settings, and different educational systems. Experimental and longitudinal research should evaluate the effects of tax literacy instruction on knowledge, attitudes, financial behavior, tax morale, civic responsibility, and entrepreneurial competence. Future studies should also compare different teaching methods, including project-based learning, educational games, simulations, field visits, conventional instruction, and digital or blended learning. Additional research is needed to develop age-appropriate assessment tools and to examine how family attitudes, institutional trust, perceived tax fairness, digital literacy, and teacher competence influence curriculum outcomes.

Educational authorities should establish tax literacy as a formal and progressively structured component of secondary education and define clear learning outcomes for knowledge, skills, attitudes, and civic responsibility. Tax concepts may be incorporated into economics, mathematics, social studies, citizenship education, entrepreneurship, and life-skills courses or presented through a dedicated tax literacy unit. Teacher training programs and in-service courses should provide educators with foundational tax knowledge, practical teaching resources, assessment strategies, and access to specialist support. Schools should use project-based activities, simulations, case studies, educational games, digital tools, group discussions, and visits to tax offices to connect instruction with real-life situations. Cooperation between educational institutions, tax authorities, universities, and professional organizations should be formalized to support content development and implementation. Educational materials should be simple, accurate, age-appropriate, locally relevant, and regularly updated. Assessment should emphasize practical performance, problem-solving, ethical reasoning, and informed decision-making rather than memorization of technical regulations.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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