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Improving Financial Literacy Among Portuguese Youth: A Multicriteria Decision Analysis Using the Analytic Hierarchy Process

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Abstract

Financial literacy is critical for individual well-being and sustainable economic development, yet significant gaps remain among Portuguese young adults. Using a two-phase design, this study combines a diagnostic assessment and multi-criteria decision analysis to identify and prioritise effective financial education strategies. In Phase 1, a diagnostic questionnaire administered to 172 first-year university students revealed pronounced deficiencies in core financial concepts. Only 29.1% correctly answered a question on compound interest, and almost half were unable to understand the concept of inflation. Additionally, 62.8% reported low exposure to financial education during compulsory schooling, and 59.9% strongly agreed that it should be included in the mandatory curriculum, indicating both unmet need and strong receptiveness. Phase 2 employed the Analytic Hierarchy Process (AHP) to evaluate five educational alternatives across four criteria. Engagement and motivation (0.32) and knowledge acquisition (0.31) were prioritised over behavioural impact (0.22) and accessibility (0.15). Based on expert assessments weighted by student preferences, in-person courses emerged as the most effective strategy (0.42), substantially outperforming online courses (0.22), videos and digital content (0.14), books (0.13), and games (0.10). The findings point to the need for policy-driven integration of structured, educator-led financial education within formal curricula, supported by approaches that prioritise active engagement and knowledge acquisition over convenience, with digital tools serving as complements rather than replacements.

Keywords: financial literacy; youth education; Analytic Hierarchy Process (AHP); multi-criteria decision analysis; financial education policy; educational strategies; Portugal; behavioural impact; diagnostic assessment

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1. Introduction

In recent years, financial literacy has garnered significant attention due to its impact on economic development and well-being, and it is increasingly recognised as a crucial factor for sustainable growth and an improved quality of life [1]. Financial literacy refers to the combination of financial knowledge, skills, attitudes, and behaviours necessary for individuals to make informed and effective financial decisions in a variety of contexts.

According to the Organisation for Economic Co-operation and Development (OECD), it encompasses not only understanding financial concepts and risks but also possessing the skills and confidence to apply this understanding to real-life decisions and to improve personal and societal financial well-being [2].

In the academic literature, financial literacy is described as more than simply knowledge of financial concepts; it includes the ability to apply that knowledge in everyday financial decision-making, such as budgeting, saving, investing, and managing credit responsibly [3]. In this study, the concept of literacy is explored primarily in terms of pure knowledge, whilst other aspects are examined to a lesser extent.

Financial literacy directly impacts financial and social inclusion [4] and influences financial well-being, which in turn affects GDP growth [5]. Consequently, countries with higher levels of financial knowledge tend to have a higher GDP per capita [6].

Despite its recognised importance, research consistently shows that younger generations often lack basic financial knowledge and competencies [7–11], even as they increasingly engage with financial products such as loans, credit cards, and savings plans at an early age [12,13]. This lack of preparedness is associated with adverse outcomes, including higher indebtedness [14], lower participation in stock markets [15], and inadequate retirement planning, an issue of particular concern in ageing societies such as those in Europe [16,17].

A growing body of literature indicates that financial literacy levels among youth are strongly influenced by sociodemographic characteristics, including household income, educational background, parental education, and gender [9,18–21]. Furthermore, young individuals tend to overestimate their financial capabilities, which may lead to suboptimal financial decisions with long-term consequences [17].

In Portugal, both national and international assessments reveal alarmingly low levels of financial literacy among young people, placing the country among the worst performers in Europe and reinforcing the urgency of implementing targeted and effective financial education initiatives [22–24]. The importance of educational initiatives regarding financial literacy is transversal across regions [25], emphasising its global relevance.

Despite growing awareness of its importance, financial literacy remains inconsistently addressed in formal education [26,27]. In Portugal, most students complete compulsory schooling without structured financial education, reflected in below-average national assessment scores, as Portugal compares very poorly with other European countries [24,26,28]. Addressing this gap requires not only information but also engaging, accessible, and behaviourally effective educational approaches for young learners.

The success of financial education initiatives depends not only on the content delivered but also on the pedagogical methods employed. Traditional approaches—such as textbook-based instruction or isolated seminars—often fail to fully engage students or produce lasting behavioural change [29,30]. In contrast, recent research highlights the potential of innovative pedagogical strategies, including digital platforms, gamification, and experiential learning, to improve both knowledge retention and behaviour modification [31]. Kautz et al. [32] emphasise the importance of developing both cognitive and non-cognitive skills through interactive and personalised learning experiences, noting that skill development is most effective when sustained over time. Interactive and participatory methods, particularly those involving real-life decision-making simulations, have been demonstrated to yield improved learning outcomes [33]. Moreover, digital tools—such as mobile applications and online courses—offer high levels of flexibility and personalisation, which are particularly appealing to younger learners [34]. Nevertheless, the literature still lacks a clear consensus on which educational methods are most effective.

To scientifically address the question of which educational approaches are most effective, this study adopts the Analytic Hierarchy Process (AHP), a structured multicriteria decision-making technique widely used in diverse domains, including education and public policy [35,36]. AHP allows the integration of multiple stakeholder perspectives—such as students, educators, and policymakers—while systematically comparing alternatives across pedagogical, behavioural, and logistical dimensions.

With regard to financial literacy education, the literature highlights several important insights. One key idea concerns the need to adopt differentiated approaches for distinct groups within society, as one-size-fits-all strategies tend to be less effective due to heterogeneity in financial behaviour and literacy levels [37]. Furthermore, focusing on concrete, real-life financial issues is generally more effective than relying on highly abstract and theoretical approaches [38,39]. In this context, experiential learning emerges as a particularly promising approach, as it enables learners to engage in practical activities and reflect on real-world situations, thereby enhancing attention, fostering critical thinking, and supporting more effective financial decision-making [38,40,41]. These insights are consistent with constructivist learning theory, which posits that knowledge is actively constructed through experience and interaction, as well as with behavioural economics, which emphasises the role of cognitive biases and real-world contexts in shaping financial behaviour. Together, these perspectives provide a strong theoretical foundation for focusing on criteria such as engagement and behavioural impact in financial education. Accordingly, active learning approaches are emphasized as essential tools to engage and motivate students, thereby facilitating the acquisition of financial literacy skills [39,40,42,43]. Building on this theoretical foundation, this study contributes to the literature by systematically combining a diagnostic survey with AHP to evaluate financial literacy education approaches. This integrated framework enables a structured and quantitative comparison of alternative pedagogical strategies across multiple criteria, addressing a gap in the literature where existing studies typically rely on either qualitative assessments or single-method approaches. By integrating subjective perceptions with systematic prioritisation, it offers a more comprehensive evaluation framework. In doing so, it provides a novel methodological contribution and advances the understanding of how different educational approaches influence engagement and behavioural outcomes.

By applying AHP to youth financial literacy education, this research aims to provide a transparent, evidence-based framework for evaluating and prioritising educational strategies. Thus, it addresses a critically important societal challenge—financial literacy level and which would be the best approach to improve it—through rigorous quantitative analysis, leveraging an appropriate mathematical model with direct real-world application and substantial potential contribution to decision support systems.

Building on this conceptual framework, this study seeks to fill the gap in understanding which educational practices most effectively foster financial literacy among young people. Accordingly, the study is guided by the following research questions:

1. What is the current level of financial literacy among first-year undergraduate students in Portugal?
2. Which criteria are most relevant for evaluating financial education strategies according to students and experts?
3. How do different educational approaches (in-person courses, online courses, digital tools, gamified, or books) compare across multiple evaluation criteria using the AHP framework?
4. Which pedagogical methods are most effective in promoting engagement, motivation, and long-term behavioural change among young learners?

To evaluate educational strategies, four decision criteria were considered: knowledge acquisition, engagement and motivation, accessibility and flexibility, and behavioural impact. Five educational approaches were assessed: in-person courses, online courses, videos and digital content, books, and games/applications. This framework allowed a systematic comparison of alternatives based on both student preferences and expert judgement. Additionally, given documented gender differences in financial literacy levels and decision-making perspectives [18,21], we explored whether male and female students exhibited distinct preferences in criteria weighting and strategy evaluation.

The main findings of this study indicate that Portuguese first-year undergraduates exhibit low financial literacy and limited exposure to structured financial education. Students overwhelmingly support the inclusion of financial literacy in mandatory school. When evaluating educational strategies, students prioritise engagement followed by motivation and knowledge acquisition, and favour structured in-person or online courses over passive or gamified methods, highlighting that effectiveness in promoting behavioural change outweighs convenience (accessibility and flexibility).

These results have clear political implications. They suggest that successful financial literacy policy requires more than curricular mandates: implementation must align with student needs and preferences, adopt active and interactive pedagogies, and integrate digital tools as complements rather than replacements. The results provide actionable guidance for policymakers and educational institutions to enhance youth financial capabilities.

The paper is organised as follows: Section 2 details the methodology used, Section 3 presents the results, Section 4 discusses these findings in depth, and Section 5 summarises the main conclusions, addresses limitations, and offers directions for future research.

2. Materials and Methods

This study employed a sequential two-phase design, as can be observed in Figure 1. Phase 1 involved a diagnostic assessment of financial literacy levels and exposure to structured financial education among first-year undergraduate students in Portugal, identifying key knowledge gaps. Phase 2 applied the AHP to evaluate and rank alternative educational strategies based on criteria weighted by students and assessed by experts. This sequential approach provided both an empirical foundation and a structured decision-making framework for evidence-based educational recommendations. Phase 1 aims to highlight the importance of taking action to achieve the objective of raising financial literacy levels, whilst Phase 2 is expected to provide relevant findings to guide the design of policies and approaches aimed at improving financial literacy levels among young people.

2.1. Phase 1: Diagnostic Assessment

Questionnaire Description

This study aims to assess the financial literacy levels of Portuguese first-year university students and their exposure to financial education during compulsory schooling. A structured questionnaire, similar to that used by Sarabando et al. [19] and Miguel et al. [20], was administered to 172 students enrolled at the Escola Superior de Tecnologia e Gestão de Viseu (ESTGV). The current study was conducted using an online questionnaire (disseminated among the students with the support of the higher education institution). Questionnaires were applied in October 2024. The study was based on a non-random convenience sample of students. The use of the same framework allows for direct comparison between the two studies, enabling an evaluation of the effectiveness of recent government initiatives to incorporate financial literacy topics into compulsory education [44].

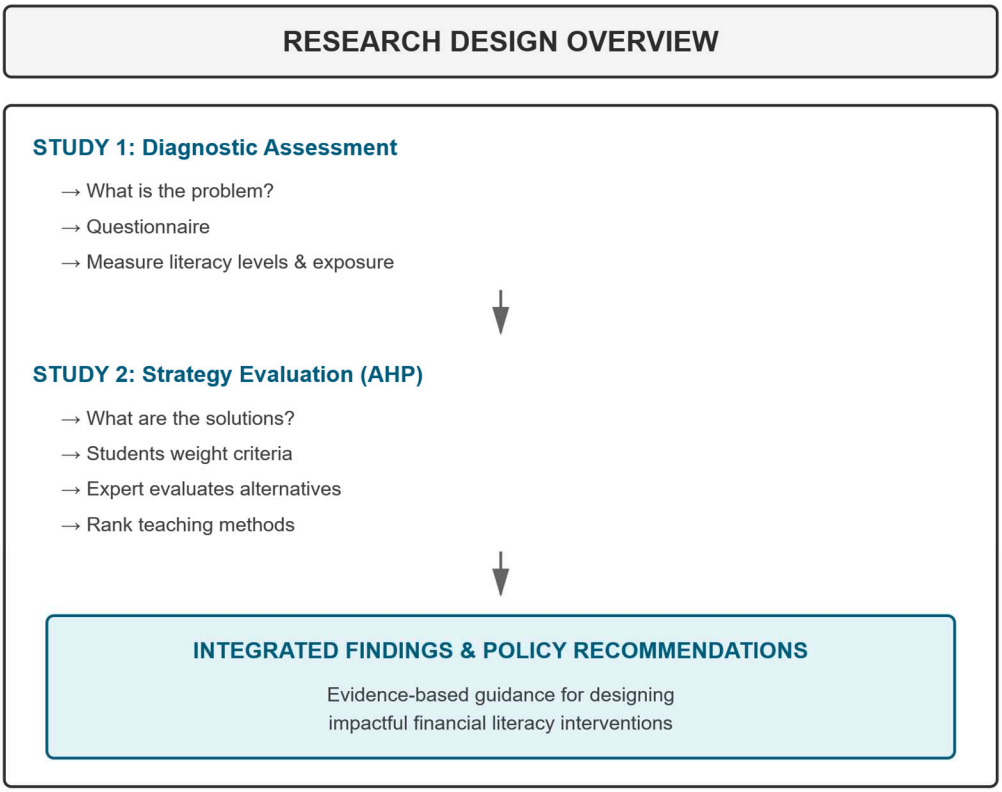

Figure 1. Research design overview of the study.

2.2. Phase 2: Multi-Criteria Decision Analysis

2.2.1. AHP Model Structure

To identify the most effective educational strategies for improving financial literacy among young people, this study employed the Analytic Hierarchy Process (AHP), a structured multicriteria decision-making method developed by Saaty [36]. AHP enables the decomposition of complex problems into a hierarchical framework, facilitating transparent and systematic prioritisation of alternatives based on multiple evaluation dimensions (Figure 2).

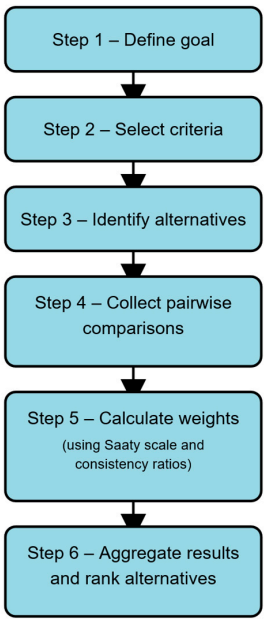

Figure 2. Step-by-step structure of the AHP application in this study.

In this study, the AHP model was structured in three levels: the overall goal, a set of decision criteria, and a group of educational alternatives.

2.2.2. Goal and Evaluation Criteria

The primary objective of the model is to determine the most effective strategy for enhancing financial literacy among Portuguese students.

The definition of the AHP criteria was guided by a conceptual framework centred on pedagogical and behavioural dimensions that matter for students. In line with prior work on the effectiveness of financial education [31,33] and on the need for well-designed financial education initiatives [34], four core criteria were adopted in this study: knowledge acquisition, engagement and motivation, accessibility and flexibility, and behavioural impact. Together, these criteria capture both cognitive learning goals and affective-behavioural outcomes in a way that is consistent with the existing literature.

To evaluate the alternatives, four decision criteria were defined, reflecting both pedagogical and behavioural dimensions:

1. Knowledge acquisition—The extent to which the educational approach provides comprehensive, accurate, and lasting financial knowledge. This includes conceptual understanding, practical application, and long-term retention.
2. Engagement and motivation—The ability of the method to capture students' interest, maintain attention, and stimulate active participation. Approaches that are dynamic, interactive, or aligned with student preferences are rated higher.
3. Accessibility and flexibility—This criterion reflects how easily students can access the educational content, considering factors such as cost, availability, time management, and adaptability to different learning paces or contexts (e.g., remote or mobile access).
4. Behavioural impact—The potential of the strategy to influence actual financial behaviours and decision-making. This includes the ability to translate knowledge into real-life actions, such as saving, budgeting, or responsible credit use.

Other dimensions, such as the cost of implementation, institutional scalability, or teacher readiness, are also important in real-world decision-making but were not explicitly modelled as criteria here. This choice reflects an intention to keep the focus on the learners' perspective and on how students perceive the effectiveness of different educational strategies, recognising that institutional and logistical constraints can vary substantially across contexts.

2.2.3. Educational Alternatives

Five educational strategies were selected as alternatives to be evaluated against the defined criteria:

1. In-person courses—Traditional classroom-based sessions led by instructors, either integrated into formal curricula or offered through workshops and seminars.
2. Online courses—Structured digital modules that may include video lessons, interactive exercises, quizzes, and asynchronous learning opportunities.
3. Videos and digital content—Short-form media, such as YouTube videos, Instagram posts, or TikTok clips, often produced by institutions or influencers to disseminate financial concepts.
4. Books—Physical or digital publications covering financial topics, including textbooks, manuals, or self-study guides.
5. Games and applications—Educational digital tools, including mobile apps or web-based platforms, that use gamification, simulations, or interactive challenges to teach financial concepts.

This set of alternatives was chosen to reflect both traditional and technology-enhanced methods, enabling a comprehensive comparison across different pedagogical formats, levels of interactivity, and behavioural influence. Figure 3 presents the AHP model for this study.

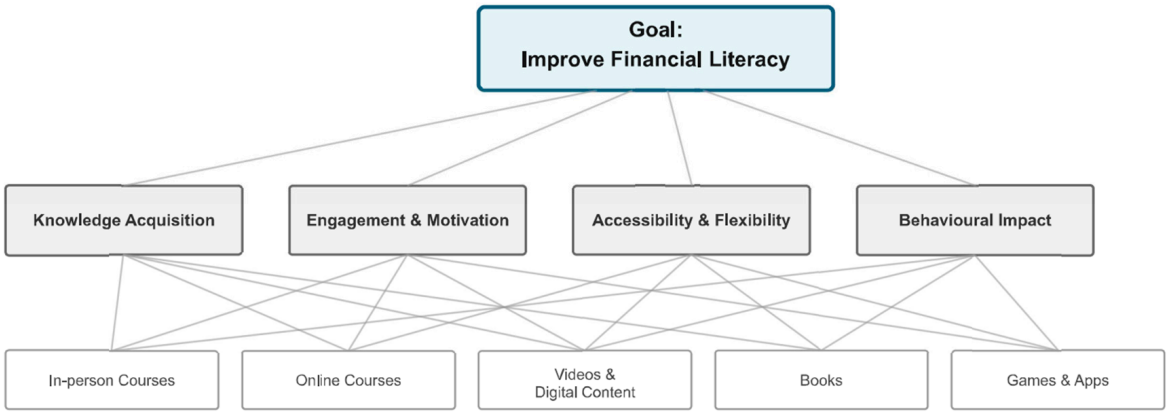

Figure 3. Hierarchical structure of the AHP model for selecting financial education strategies.

2.3. Data Collection and Processing

In this study, students were asked to assign weights to the evaluation criteria, reflecting their perceptions of which aspects of financial literacy education are most important (e.g., engagement, knowledge acquisition, behavioural impact, and accessibility). Experts, in turn, assessed the educational alternatives against these criteria, drawing on their professional knowledge and experience with effective pedagogical strategies. This separation allows the study to combine the subjective preferences of learners with the objective evaluation of alternatives by experts, ensuring that the resulting prioritisation captures both what matters most to students and what is most likely to be effective in practice.

2.3.1. Student-Based Weighting of Criteria

The weights of the decision criteria were derived from pairwise comparisons conducted by a separate group of 42 first-year university students from the same institution (ESTGV), drawn from the same population as the diagnostic sample but not necessarily overlapping with the 172 participants in Phase 1. Students compared each pair of criteria using Saaty's 1–9 fundamental scale, indicating the relative importance of one criterion over another. From these inputs, individual judgment matrices were constructed and processed using the AHP method to obtain the relative weights of the criteria. Consistency ratios were calculated to ensure acceptable logical coherence in the judgments. All individual consistency ratios were below 0.10, and aggregated matrices also met Saaty's recommended thresholds.

To illustrate the pairwise comparison process, students were asked questions such as: "When designing a financial education strategy, which is more important: behavioural impact or accessibility and flexibility? And to what extent?" These judgments were made using Saaty's fundamental 1–9 scale, where 1 represents equal importance, and 9 indicates extreme preference for one criterion over the other (see questionnaire in Appendix A). Each participant completed six comparisons between the four criteria. These matrices were then processed to calculate relative weights and verify consistency. See an example in Table 1.

Table 1. Example of a pairwise comparison matrix (student #1—criteria evaluation). (1 = equal importance, 9 = extreme importance of row over column).

	Knowledge	Engagement	Accessibility	Behavioural
Knowledge	1	4	6	2
Engagement	1/4	1	2	1/4
Accessibility	1/6	1/2	1	1/5
Behavioural	1/2	4	5	1

2.3.2. Expert-Based Evaluation of Alternatives

The evaluation of the five educational alternatives was conducted by four experts, university lecturers with formal training in finance and extensive experience in initiatives aimed at promoting financial literacy.

As with the student input, the experts performed pairwise comparisons of the five alternatives under each of the four defined criteria, resulting in ten comparisons per criterion. The comparisons were made using Saaty's fundamental 1–9 scale to assess the relative importance of each alternative with respect to the given criterion.

Based on these judgments, individual comparison matrices were constructed, and the corresponding priority vectors were calculated. The comparison matrices and consistency ratios are provided in Appendix B. Individual judgments from the expert panel were aggregated using the geometric mean method, following standard AHP procedures [36]. This method combines the pairwise comparison matrices of all experts into a single group matrix for each criterion, preserving the reciprocal property and allowing the calculation of consistent priority vectors. Consistency ratios were computed for the aggregated matrices, and all were below 0.10, confirming acceptable logical coherence. This aggregation ensures that the global priority scores reflect a balanced synthesis of all expert opinions while maintaining transparency in the decision-making process. The global priority scores for each alternative were calculated by multiplying the weight of each criterion (as determined by student input) by the relative performance score of the alternative (as assessed by the experts) and then summing across all four criteria.

We acknowledge that the number of experts is limited, which may influence the results to some degree; however, their expertise ensures that the assessments are informed and relevant. Despite this limitation, the study remains meaningful and provides valuable insights. By combining these expert evaluations with the criterion weights provided by students, the approach captures both professional insight and learner priorities, providing a structured basis for ranking educational strategies within the AHP framework.

3. Results

3.1. Sample Characteristics

The sample consisted of 172 participants, comprising 58.7% males and 41.3% females, predominantly first-year undergraduates with a mean age of 21, and 68% of whom were enrolled in management-related courses. The average financial literacy score was 44.36 on a scale of 0 to 100, representing a decrease from the 2022 average score of 47.5, reported in a previous study using the same framework [19]. Male students scored an average of 45.25, while female students averaged 43.10.

Regarding secondary school courses, Table 2 shows the background of the students in the sample; surprisingly, only 11% come from the Scientific-Humanistic Course—Socioeconomic Sciences.

Table 2. Secondary education course attended.

Secondary Education Course Attended	Percentage
Scientific-humanistic course—Science and Technology	29.1
Scientific-humanistic course—Socioeconomic Sciences	11
Scientific-humanistic course—Languages and Humanities	8.1
Scientific-humanistic course—Visual Arts	4.7
Education and Training Course or Apprenticeship Course	0
Professional Course in Economic and Business Sciences	3.5
Professional Courses in other areas	34.9
Technological Course	7.6
Artistic Course	1.2

3.2. Analysis of Diagnostic Results

The analysis revealed significant gaps in financial knowledge. Over one-third of respondents were unable to perform simple percentage calculations, nearly half (47.7%) did not understand the impact of inflation, and only 29.1% grasped the concept of compound interest. Awareness of financial instruments was low, with only 20.3% familiar with Euribor and spread, and 54.1% understanding interest payments on loans.

Students demonstrated realistic self-awareness of their financial knowledge limitations, evidenced by a strong correlation between self-assessed and actual financial literacy scores. Moreover, 30.8% of respondents reported no exposure to financial topics during compulsory schooling, and 32% reported very limited exposure to these topics. These findings suggest that attempts to integrate financial literacy into the compulsory curriculum have not yet yielded the expected improvements. Nevertheless, about 60% of participants believe that financial literacy should be a mandatory part of compulsory education (Tables 3 and 4).

Table 3. Perceptions of exposure to and relevance of financial literacy (%).

Question	1	2	3	4	5
Contact with financial literacy topics during compulsory schooling (from 1-no exposure to 5-very frequent exposure)	30.8	32.0	23.8	11.6	1.7
Agreement that financial literacy should be part of the compulsory education curriculum (from 1: strongly disagree to 5: strongly agree)	2.3	2.3	19.2	16.3	59.9

Table 4. Self-assessed financial knowledge (%).

How Would You Rate Your Financial Knowledge?	Percentage
High	1.7
Upper-medium	25.0
Lower-medium	55.8
Low	17.4

The diagnostic results from Phase 1 confirm substantial gaps in financial knowledge and limited curricular exposure among Portuguese youth. Having established the need for intervention, the next phase of this research (Phase 2) focuses on identifying which educational strategies are most likely to address these gaps effectively.

3.3. Weighting of Each Criterion

Building on the diagnostic findings, Phase 2 applied the Analytic Hierarchy Process to systematically evaluate five educational alternatives across four key criteria. The goal was to identify which teaching methods are best aligned with students' priorities and most likely to produce meaningful behavioural change.

The relative importance of the criteria was determined through pairwise comparisons conducted by 42 first-year university students. Figure 4 shows that engagement and motivation received the highest average weight (0.32), closely followed by knowledge acquisition (0.31). Behavioural impact ranked third (0.22), while accessibility and flexibility obtained the lowest weight (0.15), indicating that students give priority to pedagogical quality and perceived effectiveness over convenience when evaluating financial education strategies.

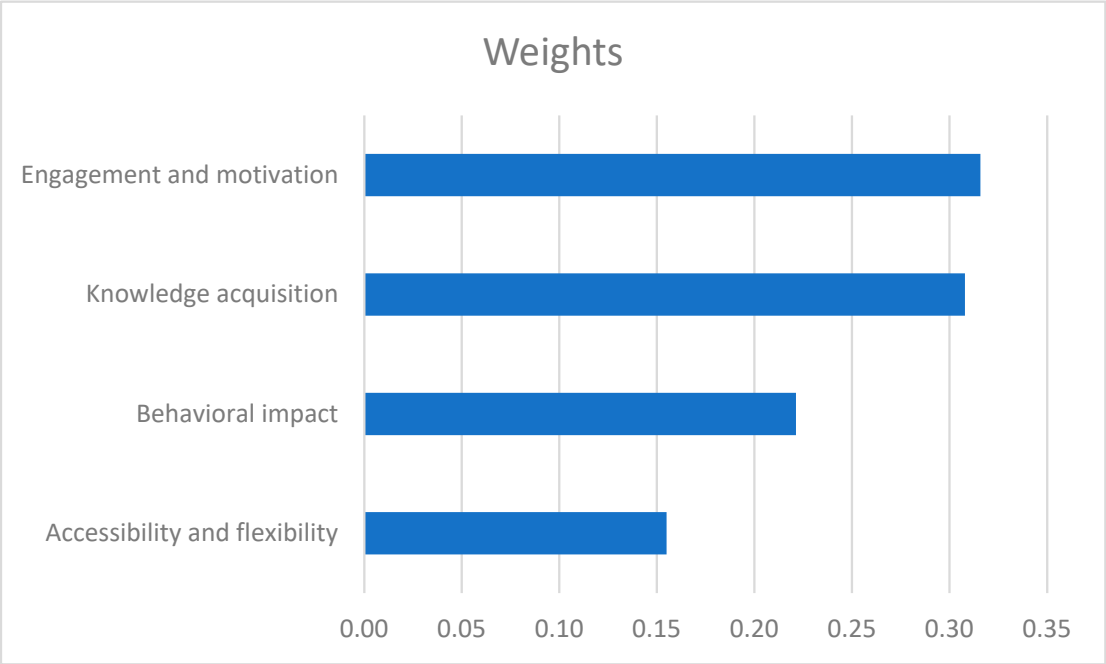

Figure 4. Average criteria weights (N = 42).

3.4. Ranking of Approaches to Improving Financial Literacy

Based on the combination of student-derived weights and the four experts' evaluations of each alternative's performance, the global priority ranking is shown in Figure 5. In-person courses ranked first with a score of 0.42, demonstrating the strongest alignment with students' priorities as assessed by experts. Online courses secured second place with 0.22, representing roughly half the priority of in-person instruction. The remaining alternatives—videos and digital content (0.14), books (0.13), and games and apps (0.10)—clustered together with relatively similar scores, all notably lower than the top two formats. This distribution suggests a clear divide between traditional structured learning approaches (in-person and online courses) and supplementary learning resources.

In addition, we explored whether males and females differed in how they weighted the AHP criteria (results presented in Appendix C). Some variation in average weights was observed between the two groups, but these differences were modest and should be interpreted with caution, given the sample size and gender imbalance. Importantly, the overall ranking of educational alternatives remained the same for both males and females, with in-person courses being clearly preferred, followed by online courses, and then the remaining options.

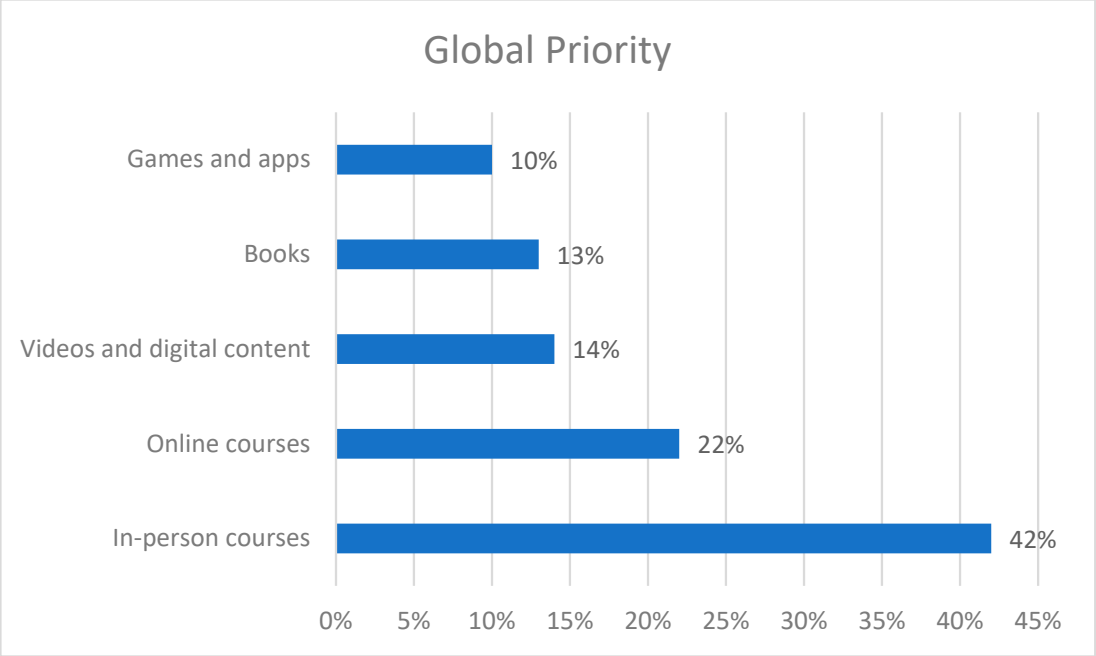

Figure 5. AHP Results—Ranking of Alternatives.

4. Discussion

The primary goal of this research was to identify effective educational strategies for improving financial literacy among Portuguese youth. This question emerged from a persistent concern: despite policy initiatives such as the "Referencial de Educação Financeira" introduced in 2013 [44], Portuguese young people continue to perform poorly in financial literacy assessments, both nationally and when compared to their European peers [24,26,28]. To begin by addressing the research questions directly before exploring the results in greater detail, it is important to highlight the following points:

- The level of financial literacy among the Portuguese students in the sample is very low.
- What students value most in the learning process is engagement and motivation, followed by knowledge acquisition, behavioural impact, and accessibility and flexibility, in that order.
- In this regard, the best approach to teaching financial literacy is in-person courses, with games and apps coming last.

We approached this challenge through two complementary stages. The first diagnosed the current state of financial literacy among first-year university students, examining not only their knowledge levels but also their exposure to financial education during schooling and their attitudes toward the subject. The aim, therefore, is to emphasise the importance and necessity of taking action to improve levels of financial literacy. The second stage applied the Analytic Hierarchy Process to systematically evaluate different educational approaches, combining student priorities with expert assessment to rank alternatives based on multiple criteria.

Both objectives were successfully met. Our diagnostic phase confirmed substantial gaps in financial knowledge and revealed that most students had minimal exposure to financial topics during their compulsory education. At the same time, we found strong support among students for making financial literacy a mandatory part of the curriculum. The decision analysis phase showed that students attach substantial importance to engagement and knowledge acquisition when evaluating educational methods. These findings are consistent with the literature in that they reinforce the need to involve students in the

learning process and keep them engaged [45–47]. In-person courses are most likely to achieve this, followed by online courses. These findings provide a foundation for designing interventions that are both evidence-based and aligned with the needs and preferences of the target population.

The diagnostic results paint a concerning picture. First-year university students in our sample demonstrated alarmingly low levels of financial literacy. Many struggled with fundamental concepts that most would consider essential for navigating adult life: understanding compound interest, recognising how inflation affects purchasing power, and grasping basic loan mechanics. Consistent with this, the composite financial literacy index constructed in this study shows a negative average for both male and female students, reflecting the low level of financial literacy. These difficulties are not unique to our sample. Previous research in Portugal has documented similar patterns, and international comparisons consistently place Portuguese youth below European averages in financial literacy [24,26–28]. What makes this particularly troubling is that these gaps persist more than a decade after financial education was formally incorporated into national policy frameworks [44].

Regarding exposure to this topic, nearly two-thirds of students from our sample reported low or very low exposure to financial topics during their years of compulsory schooling. This suggests a significant implementation gap between policy intention and classroom reality. The "Referencial de Educação Financeira" exists on paper, but it appears not to have reached most students in any meaningful way. Interestingly, students themselves seem aware of these limitations. They demonstrated realistic self-assessment of their knowledge gaps in our survey, and expressed strong support for integrating financial literacy into the curriculum. This combination of recognised need and receptiveness presents both a challenge and an opportunity for educational reform.

In this context, given the low level of financial literacy, students' limited exposure to the subject, and their willingness to learn about personal finance, the second phase serves to complement and explore the best possible approach.

When we asked students to evaluate different educational approaches criteria through the AHP framework, clear patterns emerged. Engagement and motivation, and knowledge acquisition received the highest weights, closely followed by behavioural impact, while accessibility and flexibility received comparatively less emphasis. This hierarchy tells us something significant: students are not primarily looking for educational experiences that are easy or entertaining, but rather for approaches they believe will actually change how they manage money in real life. This is in line with the literature, which emphasises the importance of active approaches that enable pupils to engage with the real world and apply what they are learning to their own lives [37–43].

This prioritisation translated directly into the ranking of alternatives. In-person courses emerged as the clear preference, followed at some distance by online courses. Videos, books, and games all ranked considerably lower. At first glance, this might seem surprising given how much young people engage with digital media and gaming in other contexts. However, the pattern becomes clearer when we consider how students weighted the criteria. Games and apps scored well on accessibility and engagement but were perceived as less effective for achieving deep knowledge acquisition and, crucially, for influencing actual financial behaviour. Given that engagement, knowledge acquisition, and behavioural impact collectively accounted for 85% of the total weight, these tools ended up at the bottom of the ranking despite their strengths in accessibility.

This reflects something that should be highlighted: effective learning, particularly when the goal is behavioural change, requires structured interaction, guided discussion, opportunities for questions and clarification, and the kind of engaged facilitation that

remains more reliably delivered in face-to-face settings. Research from countries that have achieved better outcomes in financial literacy education supports this interpretation. The Netherlands, for instance, uses a programme where financial professionals visit schools and engage students through interactive activities and discussions. The United Kingdom embedded financial education within mathematics and citizenship courses, creating structured opportunities for sustained engagement rather than one-off interventions. These approaches combine curricular integration with active pedagogical methods, and they have demonstrated measurable improvements in both knowledge and behaviour.

The relatively low ranking of games and apps deserves careful consideration. This should not be read as evidence that digital tools have no place in financial education. Rather, it suggests that current implementations may not adequately address the dimensions students consider most important. Most educational games focus heavily on engagement mechanics—points, badges, levels—without deeply integrating the behavioural principles and real-world decision contexts that would enhance their impact on actual financial behaviour. There is considerable room for improvement here. Digital tools could be redesigned to incorporate evidence-based insights from behavioural economics, provide more realistic decision-making scenarios with meaningful consequences, and offer personalised feedback that helps users understand not just whether their choices were correct but why certain approaches lead to better financial outcomes. In fact, games do play a role, serving as a valuable addition to the learning process, helping to increase students' interest in the subject matter, as well as helping to consolidate their knowledge [48–50].

These findings carry significant implications across theoretical, methodological, and practical domains. From a theoretical standpoint, our results challenge common assumptions about how younger generations prefer to learn. There is a prevailing narrative that digital natives naturally gravitate toward technology-mediated, self-paced learning experiences. Our findings suggest a more complex reality. When the stakes are high—when students are evaluating what will actually help them develop competencies they recognise as important for their future—they prioritise perceived effectiveness over convenience or novelty. They want approaches that work, even if those approaches are less flexible or require more effort.

Methodologically, this study demonstrates how structured decision-making frameworks can contribute to educational research. The Analytic Hierarchy Process allowed us to systematically incorporate multiple perspectives—student priorities through criteria weights, expert judgment in evaluating alternatives—and to make those perspectives transparent and quantifiable. This approach addresses a gap in much educational research, where recommendations often reflect either pure expert opinion or aggregated student satisfaction ratings, without systematically weighing the trade-offs between competing objectives. The two-study design also offers a model worth replicating: grounding intervention design in empirical diagnosis of the problem before proceeding to systematic evaluation of solutions.

The practical implications are substantial. For policymakers, these findings underscore that simply mandating financial literacy in curricula is insufficient. Portugal already has a policy framework; what has been lacking is systematic implementation. Moving forward requires several critical elements. First, teacher preparation must be treated as central rather than peripheral to reform. Teachers need both content knowledge in personal finance and training in the active learning methodologies that research shows are most effective. Professional development cannot be a one-time workshop; it needs to be sustained, supported with high-quality materials, and embedded in communities of practice where teachers can share strategies and troubleshoot challenges together.

Second, while our findings show student preference for in-person instruction, this should not be interpreted as a mandate for traditional lecture formats. The evidence overwhelmingly supports interactive, discussion-based approaches: case studies that present realistic financial dilemmas, group work where students analyse and debate different strategies, simulations where they experience the consequences of financial decisions in low-stakes environments, and project-based assignments that require applying concepts to their own financial contexts. These active learning strategies are effective precisely because they bridge the gap between knowing and doing, the gap that students, through their prioritisation of behavioural impact, have told us matters most.

Third, digital tools should be reconceived not as replacements for structured instruction but as complements to it. Online platforms can extend learning beyond classroom walls, providing opportunities for practice, reinforcement, and exploration at students' own pace. Games can make abstract concepts concrete and allow for repeated practice of decision-making skills. Mobile apps can deliver just-in-time information and nudges that help students apply what they have learned in real financial situations. However, these tools will be most effective when integrated into a larger pedagogical strategy that includes teacher guidance, peer interaction, and structured reflection.

The recent policy developments in Portugal—the renewed emphasis by the Direção-Geral da Educação on financial literacy and the government proposal to make it mandatory across all years of compulsory schooling—align well with these recommendations. However, translating policy commitments into classroom realities will require addressing known barriers: teacher readiness, curricular crowding, resource constraints, and uneven digital infrastructure across schools. Success will depend not just on mandates but on systematic capacity-building, adequate resourcing, and mechanisms for quality assurance and continuous improvement.

5. Conclusions, Limitations, and Future Research

This research tackled a pressing educational challenge: the persistent gap in financial literacy among Portuguese youth and the need to identify effective strategies for addressing it. Through a two-phase investigation combining empirical diagnosis with structured decision analysis, we have generated findings that advance both understanding and practice in this critical domain.

Our diagnostic assessment confirmed what many have suspected but needed documenting with current data: first-year university students demonstrate worryingly low levels of financial literacy, struggle with concepts that should be foundational for adult life, and report minimal exposure to structured financial education during their schooling years. The implementation gap between policy frameworks and classroom reality is substantial. Yet students themselves recognise these deficiencies and overwhelmingly support making financial literacy a mandatory component of education. This combination of need and receptiveness creates favourable conditions for reform, provided interventions are designed thoughtfully.

The decision analysis phase revealed that when students evaluate educational approaches, they prioritise engagement, knowledge acquisition, and behavioural impact collectively (accounting for 85% of total weight). They are looking for methods that will genuinely influence how they manage money, not just transmit information or provide entertainment. This pragmatic focus led them to favour in-person courses, followed by online courses, over books, videos, or games. This preference should not be misread as resistance to innovation or attachment to outdated teaching methods. Rather, it reflects a mature assessment that effective learning, particularly when aimed at behavioural change, benefits

from structured interaction, expert facilitation, and sustained engagement, elements that remain more consistently available in face-to-face settings.

These findings make several important contributions. Empirically, they document the current state of financial literacy among Portuguese youth with recent data and reveal the substantial gap between policy intentions and implementation realities. Methodologically, they demonstrate how multi-criteria decision analysis can support evidence-based curriculum design by systematically incorporating diverse stakeholder perspectives. Substantively, they challenge common assumptions about how younger generations prefer to learn, showing that perceived effectiveness trumps convenience or novelty when the stakes are high.

The timing of this research is particularly relevant. Portugal is currently moving toward mandatory integration of financial literacy across all years of compulsory schooling, a development reflected in both the strategic vision of the Direção-Geral da Educação and recent government proposals. Our findings provide concrete guidance for this implementation phase. They suggest that success will require moving beyond curricular mandates to address the enabling conditions for effective instruction: substantial investment in teacher preparation, development of high-quality pedagogical materials, adoption of active learning methodologies that prioritize real-world application and behavioural impact, strategic use of technology as complement rather than replacement for structured instruction, and rigorous evaluation mechanisms that track not just knowledge gains but actual changes in financial behaviour.

None of this will be simple or quick. Schools face real constraints in time, resources, and capacity. Teachers need support, not just expectations. Digital infrastructure varies substantially across regions and socioeconomic contexts. These challenges are genuine and must be addressed pragmatically. However, the alternative—continuing to send young people into adulthood without the financial literacy they need—carries unacceptable costs both for individuals and for society.

The path forward requires coordinated action across multiple domains. Policymakers must provide not only mandates but also the resources and support structures needed for implementation. Teacher education programmes must integrate financial literacy content and effective pedagogies. Schools must create space in already crowded curricula for sustained engagement with these topics rather than superficial coverage. Technology developers should work collaboratively with educators and behavioural scientists to create digital tools that genuinely enhance learning rather than simply repackaging traditional content in new formats. Researchers must continue to evaluate what works, for whom, and under what conditions, providing the evidence base needed for continuous improvement.

This study has some limitations that should be considered when interpreting its findings. The sample was limited to students from a single university, mostly enrolled in management-related courses, which constrains the generalisability of results to other fields and populations. Students from other academic backgrounds may prioritise different criteria, given their varying levels of interest in financial literacy topics and potentially distinct cognitive frameworks that could lead them to prefer different educational approaches. However, in geographic terms, although all students were currently at the same institution, they came from different secondary schools across different regions of Portugal, thus partially mitigating concerns related to geographic homogeneity. Nevertheless, it is worth noting that management courses attract students with highly diverse academic backgrounds—some coming from economics-related secondary tracks, others from humanities or natural sciences-focused courses—suggesting that the heterogeneity within management students supports a degree of result generalisability, albeit with the caveat that this approach should be tested with more diverse samples in future research. The

cross-sectional design captured perceptions at one point in time and does not allow assessment of causal or long-term behavioural effects. Methodologically, having students define evaluation criteria while experts assessed educational alternatives in the AHP framework provided valuable triangulation but may not fully reflect how students would appraise the approaches after real participation. Future research should address these aspects by involving more diverse samples, adopting longitudinal designs, integrating teacher input, and conducting comparative analyses across educational systems.

We acknowledge that the findings presented in this study are based solely on the AHP methodology. While AHP provides a structured and transparent framework for multi-criteria decision analysis, additional validation using alternative techniques such as TOPSIS or PROMETHEE could further reinforce the robustness of the results. Given the scope and objectives of the current research, such comparative analyses were not undertaken, but they represent a promising avenue for future studies to confirm the stability of the prioritisation of educational strategies.

Improving financial literacy among young people is not simply an educational objective; it is a societal investment with long-term returns. As financial products become more complex, economic uncertainties persist, and individuals bear increasing responsibility for securing their own financial futures, the ability to make informed financial decisions becomes ever more critical. Young people today will face financial challenges that previous generations did not encounter or encountered with more institutional support. Preparing them adequately is both a practical necessity and an ethical obligation.

These findings reinforce that improving financial education for young people is not only about adding new content to the curriculum, but about creating conditions that allow it to be taught well. Financial literacy acquired in youth can shape everyday financial habits and long-term choices, with effects that extend into adulthood and across generations. At the same time, embedding financial literacy meaningfully in schooling is challenging: teachers require specific training, curricula are already crowded, and schools operate under tight resource constraints. In this context, a phased strategy may be both realistic and effective, starting with pilot programmes in selected schools or regions, supported by targeted interim measures that can be scaled up as evidence accumulates and capacity is built. The central question is no longer whether financial literacy matters, but whether the education system can mobilise the sustained commitment needed to turn this recognition into well-designed interventions that genuinely improve young people's financial capabilities.

The stakes are high, but so is the opportunity. Done well, integrating effective financial literacy education throughout schooling could produce a generation of young adults substantially better equipped to navigate the financial dimensions of their lives. That outcome is worth the effort it will require to achieve. Investing in youth financial literacy today is investing in the economic resilience of tomorrow's society.

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Appendix A

Instructions for Completing the Questionnaire

Objective: To compare pairs of criteria in order to identify which are most important in the development of financial education programs.

Criteria for Comparison

1. Acquired Knowledge (Ease of Learning): Clarity of content, teaching methods, knowledge progression, and practical applicability.
2. Engagement and Motivation: Interactivity, content relevance, gamification, feedback and rewards.
3. Accessibility and Flexibility: Multi-platform availability, cultural/language suitability, personalised pace, cost.
4. Behavioural Impact: Change in financial habits, self-confidence, and effective lifelong learning.

In each row, CHOOSE AND MARK ONLY ONE NUMBER using the following scale: Importance Scale:

- 1 = Equally important
- 3 = Moderately more important
- 5 = Strongly more important
- 7 = Very strongly more important
- 9 = Extremely more important

Table A1. Criteria Comparison.

Acquired Knowledge	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Engagement and Motivation
Acquired Knowledge	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Accessibility and Flexibility
Acquired Knowledge	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Behavioral Impact
Engagement and Motivation	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Accessibility and Flexibility
Engagement and Motivation	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Behavioral Impact
Accessibility and Flexibility	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Behavioral Impact

Gender: Male[ ] Female[ ] Non-binary[ ]. Age: _____.

Appendix B

Table A2. Comparison of teaching alternatives by criterion.

Knowledge	In-Person Training	Online Training	Videos and Digital Content	Books	Games and Other Applications
Knowledge–CR 0.087					
In-person Training	1	3	8	6	9
Online Training	1/3	1	4	3	8
Videos and Digital Content	1/8	1/4	1	1/4	4
Books	1/6	1/3	4	1	5
Games and Other Applications	1/9	1/8	1/4	1/5	1

Table A2. *Cont.*

Knowledge	In-Person Training	Online Training	Videos and Digital Content	Books	Games and Other Applications
Engagement–CR 0.078					
In-person Training	1	4	6	9	7
Online Training	1/4	1	2	7	5
Videos and Digital Content	1/6	1/2	1	5	3
Books	1/9	1/7	1/5	1	1/4
Games and Other Applications	1/7	1/5	1/3	4	1
Accessibility–CR 0.052					
In-person Training	1	1/3	1/7	1/9	1/9
Online Training	3	1	1/6	1/7	1/7
Videos and Digital Content	7	6	1	1/3	1/3
Books	9	7	3	1	1
Games and Other Applications	9	7	3	1	1
Behavioural–CR 0.046					
In-person Training	1	2	3	6	9
Online Training	1/2	1	2	5	8
Videos and Digital Content	1/3	1/2	1	4	5
Books	1/6	1/5	1/4	1	4
Games and Other Applications	1/9	1/8	1/5	1/4	1

Appendix C

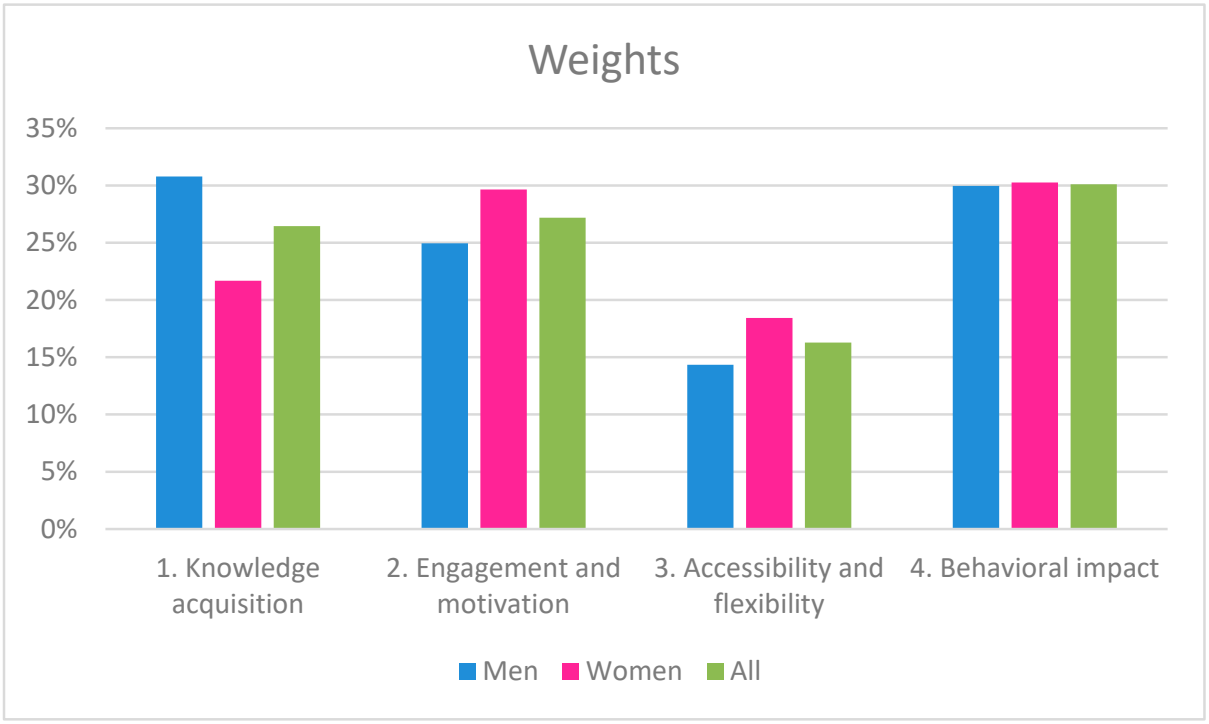

Figure A1. Comparison between men and women regarding criterion weights.

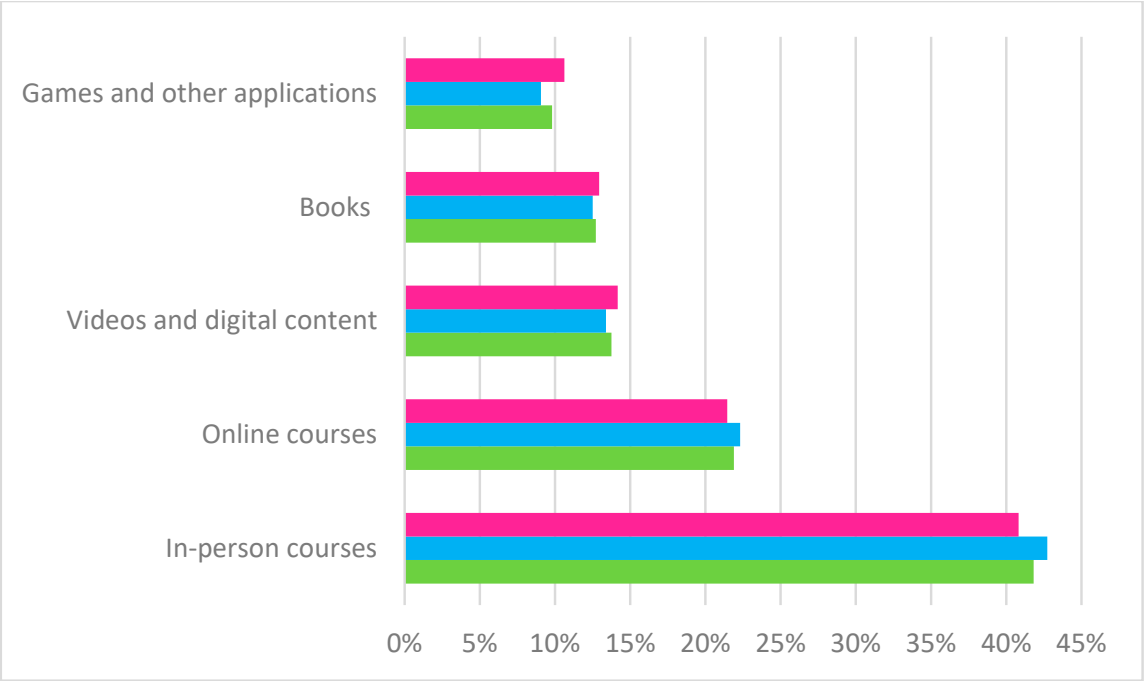

Figure A2. Comparison between men and women with respect to the ranking of teaching alternatives.

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