CONCEPT AND EVALUATION OF A COURSE ON FINANCIAL LITERACY FOR STUDENTS OF (BUSINESS) INFORMATICS

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Abstract - Financial literacy is crucial for making in formed financial decisions. However, studies indicate varying knowledge levels, with many lacking basic financial understanding. Given the growing emphasis on personal financial responsibility, governments are implementing financial education strategies. In 2024, the OECD and the German government introduced a national strategy to address these gaps.This paperpresents a financial education course at Mannheim University of Applied Sciences for computer science students nearing graduation. The course integrateskey financial concepts such as assetmanagement, taxation, insurance, and investment strategies, incorporating IT skillsusing Python for financial modeling. Using a mix oflectures, casestudies, and assessments, the course aims to enhance financial literacy. Initial feed back has been positive, and further evaluationis planned in collaboration with the Mannheim Institute for Financial Education (MIFE). This initiative servesas a model forsimilarprograms, with on going refine ments based on student feedback and empirical evaluation.

Keywords - Financial Literacy, Financial Education, Investment Strategies, IT-based Financial Modeling

I. INTRODUCTION

A. The Term Financial Literacy

Financial literacy describes the ability to understand financial topics and apply this knowledge to make informed financial decisions. It is therefore about dealing with money and financial products in an informed and sensible way on a personal level and managing one's individual situation in financial matters in a self-determined manner.

Financial education is relevant for all social groups and people of all ages, naturally in different forms and adapted to the respective situation.

In recent years, extensive research on financial literacy has been established, which collects and analyzes the respective level of knowledge worldwide [9] [13]. The research shows that the level of knowledge on this topic is very heterogeneous; many people lack knowledge about elementary relationships such as inflation and interest rates. These gaps in knowledge can have a dramatic impact on their personal situation, for example in terms of over-indebtedness or poverty in old age. In addition, many countries, including Germany in particular, are focusing on greater personal responsibility in financial matters. This applies above all to taking responsibility for an adequate or good pension [3].

Against this backdrop, many countries are in the process of developing a financial education strategy or have already defined one. In 2024 the OECD, in close consultation with the government in the Federal Republic of Germany, made a proposal for a national strategy on financial education, which is to be implemented over the next few years [14]. Higher personal education helps both the individual and a country's society as a whole and is therefore also a government task[6].

There are usually many players who are active in the education system [4]. This is particularly true of financial education, as the financial system offers and sells a wide range of often complex products. Banks, insurance companies, financial and investment advisors and asset managers take advantage of this lucrative business, but not always to the benefit of the customer or consumer, as the costs of the advice are often hidden in the products. Nevertheless, these players offer a wide range of information and events and are therefore part of the financial education on offer. An important goal of broad social financial education is to have an informed, qualified and mature view of the respective offers to be able to meet (supposed) advisors at eye level.

There are now a wide range of financial education offers for all age groups. As part of the implementation of its financial education strategy, the German government created a central platform at an early stage, on which the content and educational offers are bundled and choreographed [7].

B. Objectives and Approach

The authors of this article are professors of (business) computer science at the Faculty of Computer Science at Mannheim University of Applied Sciences. This faculty offers, among other programs, several professionally qualifying bachelor's degree programs with a focus on applied computer science. Against the background described above, the authors have designed a course aimed at students who are about to complete their bachelor’s degree.

The aim of this article is to describe the concept of our course and thus provide a basic framework and building blocks in terms of constructive design that can also be used in comparable scenarios. To this end, we describe our basic ideas, the motivation and the basic design of the course. We then provide an overview of the content of the course. We also

describe what we believe to be a unique attempt to integrate IT skills that can be assumed for our participants from computer science degree programs into the course. Specific scenarios are calculated, which is intended to increase motivation and go beyond theoretical knowledge to make the effects of financial decisions tangible – for example, the difference in the result when retiring from a monthly savings plan in a ETF (Exchange Traded Funds) based on shares starting at the age of 25 or 35.
In the medium term, we attach great importance to an evaluation that can prove that the content is useful, that participants find it helpful for their personal financial planning in the long term, and that the event concept is in line with the OECD's measurement methods.

II. AIMS AND CONCEPT OF THE COURSE

A. Initial Situation and Objectives

Why does it make sense to address students shortly before they complete their studies? Why is financial education particularly relevant for (business) computer scientists?

Students will typically enter the workforce after completing their studies and can expect above-average salaries due to the looming shortage of workers in Germany and the particularly high demand in the IT sector. For most of them, this is the first time in their lives that they have money at their disposal. At the same time, their life situation changes frequently. This is accompanied by the need to make a variety of decisions. Due to the fact that they are often only now completely detached from their parents' home in financial aspects, decisions must be made, for example, about necessary insurance policies and those to be taken out, the housing situation, savings rates and formats for larger investments or retirement provision, as well as the reduction of existing debts if necessary. Over the last few years and decades, the reliability and scope of public pension systems has declined in all countries, meaning that greater financial literacy has become increasingly important.

Furthermore, graduates are a very interesting target group for companies in the financial sector [4]. This is demonstrated, for example, by the fact that financial brokers and structured sales organizations hold events at universities that are supposedly free of charge. These events address useful topics on career entry and upcoming decisions with financial implications. However, the main purpose of these events is for companies in the financial sector to make contact. Certainly, not all the information is bad or even wrong – but it is prepared in a behavioral-psychological way that is intended to unsettle the participants at such events and lure them into the advisory service. This is where we come in and want to sensitize the participants of our events and put them in a position to make an informed assessment of the advice on offer, especially regarding the usefulness and return-reducing costs of the product in question.
IT graduates often have a very good income. In addition to being employed, many IT graduates are also active as company founders or choose solo self-employment (freelancers), which requires special financial planning.

B. Concept

The course comprises 4 semester hours per week, i.e. four 45-minute lectures per week. The lecture period at our university is 15 weeks.
The course is designed as a compulsory elective module. Students in the last two semesters of the bachelor's degreecourses can choose this module as one of 7 elective modules. The faculty pursues a very open and flexible concept here, which allows students to focus on relevant topics individually. The elective concept largely ensures that only interested students take part in the course.
The course covers a wide range of content, which is described in detail in the following section. It should be noted that much of the content is highly dependent on the structure in the respective countries. For example, aspects of the tax treatment of income, regulations on the purchase, sale and rental of real estate or the pension system vary greatly from country to country. There are, of course, similarities above all in the area of fundamentals (money, interest, inflation, etc.). Against this background, comparable content from other countries is at best suitable for orientation in the basic structure, but not transferable in detail.

The teaching and learning situations are varied. A combination of presentations, case studies, online material, self-study units and quizzes are used. The event is rounded off with guest lectures by experts and a visit to the Money Museum of the Deutsche Bundesbank [8].

From our point of view, the target group we have outlined is the ideal recipient for our concept, as these people have both the financial resources available at short notice and are about to make important decisions. Research has shown that it makes little sense, for example, to show fourteen-year-old schoolchildren a differentiated picture of retirement provision or real estate financing options, as these decisions are a long way off at this stage and therefore do not address the relevant realities of life [3] [18].

C. About the Examination

The examination of acquired skills follows the concept of continuous assessment established at Mannheim University of Applied Sciences. There is no single examination at the end of the course. Instead, the examination is divided into partial examinations in different formats. We use online tests on the learning platform (here: Moodle), written examinations and case studies.

Another special feature is that students are asked to actively work in depth on a topic of their choice from the course and create a comic [19]. Here, for example, the one-off long-term purchase of three specific individual shares can be discussed in comparison to an ETF savings plan.

III. STRUCTURING THE CONTENT

A. Orientation Framework

The basics of money, interest, inflation and taxation serve as an orientation framework in our course. To get a feel for these terms in addition to the theoretical definitions, an excursion to the Money Museum of the Deutsche Bundesbank in Frankfurt a. M. is usually organized [8].

We then look at various scenarios of persona life cycles. In the following example, our persona lives off a student loan during her studies so that she can concentrate fully on her studies. Now that she has successfully graduated, she can earn money and save up a small fortune over the course of her working life. This can be done through a broad diversification of investments in different asset classes, which will be discussed in the context of the course. Professional success also helps to increase income. During working life, taxes and insurance are payable on the gross salary, whereby a distinction is made between compulsory and optional insurance. By the time they retire, the persona has become accustomed to a certain standard of living, although their pension income does not correspond to their final salary. The total assets saved decrease in retirement age until death, with residual assets remaining as an inheritance.Fig. 1 shows the idealized development of a persona's wealth over time.

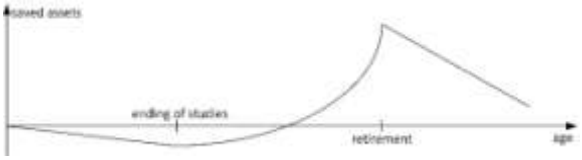

Fig 1: Idealized development of wealth over time

In this way, we can look at different personas who, for example, lead a single household or start a family with children, who rent for life or buy an owner-occupied property, who have a one-off sum as an inheritance due to the death of their parents during their working life, who may lose their job one day and become over-indebted.

B. The Contents at a Glance

The asset classes mentioned in the previous chapter are identical worldwide, for example individual shares, bonds, ETFs of various kinds, real estate, precious metals, commodities and cryptocurrencies as well as money-like investments. In this context, the return triangle and the pyramid of investments are discussed, which also provide for a certain proportion of liquid assets, for example in the form of cash or overnight money. This is intended to cover unexpected expenses such as repairs. The pyramid is used to motivate various typical investment portfolios, from security-oriented to speculative portfolios.

However, compulsory contributions are country specific. Here we focus on the situation in Germany, primarily with income tax and contributions to pension, health and long-term care insurance. The importance of additional private provision is explained using the pension and long-term care insurance models. We differentiate between the situations of employees, civil servants and freelancers. Our orientation framework is therefore generally valid, but country-specific peculiarities must be considered, particularly at this point.

We then discuss optional insurances and the importance of each type of insurance, from liability, disability, life and accident insurance to buildings and comprehensive insurance.

In addition to salary contributions, insurance and investments, there are certain life situations in which money needs to be borrowed. A further component is therefore the various types of credit and their purpose, from overdraft, credit line and installment loans to a building loan agreement and a loan for a property purchase through to car leasing.

C. Integration of IT skills

To impart practical and real-life oriented content, the practical application in realistic scenarios must be taught in addition to the fundamental relationships and concepts. On the one hand, carrying out calculations reinforces the understanding of the interrelationships and, on the other hand, conveys the competence to calculate and assess personal decision-making situations even after the course. Therefore, such components should not be missing in an educational program for the target group described.

The calculations can easily be carried out using spreadsheet software such as Microsoft Excel [16]. Our students have already gained extensive programming experience during their computer science studies. We therefore use the easy-to-use programming language Python [17]. The uncomplicated creation of small scripts is very simple thanks to the use of Jupyter Notebooks [10]. In this specific case, we recommend the Anaconda distribution [1], which is preconfigured for beginners. It can also be used via a free cloud service [2]. The NumPy Financial library[11] is a collection of basic financial functions.

The use cases described below illustrate the integration into the course. Fig. 2 shows a Jupyter notebook in which the scenario is first described as

text. The result is then calculated and output using a function from the NumPy Financial library.

Fig. 2: Calculation of final assets for monthly payments

The second example, shown in Fig. 3, shows the calculation of a monthly installment for a loan with a fixed term and fixed interest rate.

Fig. 3: Calculation of a monthly rate for a loan

IV. EVALUATION

The course was offered for the first time in the winter semester 2023/24 for all computer science courses at Mannheim University of Applied Sciences. The 30 participants gave very positive individual feedback afterwards. The second run of the course is currently taking place in the winter semester 2024/25.

A professional evaluation of the courseis planned through inclusion in the EvaFin joint project (Evaluation of financial education interventions across the lifespan) [12]. Our direct contact here is the MIFE Institute (Mannheim Institute for Financial Education) at the University of Mannheim. The aim is to track the financial knowledge of the students who took part in the event as a cohort, ideally over several years [5]. The knowledge and skills of the participants before and after attending the event will be evaluated based on OECD measurement methods. If necessary, a control group can be tracked in parallel in the form of an A/B test in which the participants did not attend the event.

There are also plans to extend participation in the courseto other faculties at Mannheim University of Applied Sciences, such as the Faculty of Design and Engineering faculties.

At the same time, the courseis constantly being developed further. For example, the prototype implementation of a financial chatbot and an investigation into the influence of gamification on the teaching of financial education in the form of a comparison of two learning elements for long-term wealth accumulation have already been carried out in cooperation with the Wilhelm Büchner Hochschule (WBH).

V. CONCLUSION

In this paper, we have presented the concept of an event for students who are about to graduate. The content of the event specifically addresses the situation and needs of the target group. We therefore contribute to a targeted educational offer that can serve as a basis for events at other universities and in other subject areas. We have also established a special link to IT-related degree courses.

The concept will be further refined over the next few runs. This will be based on student feedback, an orientation towards the financial strategy of the Federal Republic of Germany and the results of an external evaluation, which will be obtained as part of the development of an overarching evaluation concept for financial education courses.

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