APPLICATION OF MOTIVATIONAL DESIGN IN THE EDUCATION OF COMPUTER SCIENCE STUDENTS

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Abstract. This article presents findings regarding the planning and design of an educational strategy aimed at increasing motivation and activity in the learning process among computer science students. The main steps in developing a motivational course design are presented. Keller's model for developing a motivational design is examined in detail. This model was applied in designing the educational strategy for teaching computer science students in the course "Marketing and Marketing Information Systems". The training results have been analyzed.

Key Words: *motivational design, learning models, educational strategies*

Introduction

In recent years, the rapid advancement of Artificial Intelligence (AI) has significantly impacted student motivation and engagement. The accessibility of AI tools often leads to a reliance on automated solutions for complex tasks and projects. However, due to a frequent lack of foundational professional knowledge and critical thinking, students tend to over-rely on AI-generated data without sufficient verification. This shift presents a critical challenge for educators: the need to design courses using more robust strategies that actively involve and motivate learners.

The effectiveness of the learning process depends on various factors, with student engagement being paramount. By structuring course content through appropriate pedagogical methods, educators can create an environment conducive to achieving desired learning outcomes [4].

In a student-centered design, the selection of didactic strategies must prioritize the active acquisition of knowledge and skills. Emphasis should be placed on methods that encourage independent research, rigorous analysis, and the deep comprehension of information [5].

Motivational design – Keller model

Keller's model suggests ways to keep learners engaged. It is based on expectancy theory, which "assumes that people are motivated to engage in an activity if it is perceived as related to the satisfaction of personal needs (the value

dimension) and if there are positive expectations of success (the expectancy dimension)" [1].

Figure 1. Keller's Motivational Design

Motivational design is defined as "the process of organizing resources and procedures to achieve changes in people's motivation" [2]. Keller's model of motivational learning is also known as the **ARCS model: Attention, Relevance, Confidence, and Satisfaction**. Each of these components is further divided into three subcategories, although all of them can be combined into a systematic motivational process. It is important to motivate learners and to ensure continuity of motivation during training.

Attention

The first component is attention. Before any learning can take place, the teacher must capture the student's attention. Attention must be maintained throughout the process for meaningful learning to occur. It is important for students to be engaged with the topic. This can be achieved by satisfying the interests of the class. We can capture their attention using three specific strategies:

- *Provoking perceptions*: capturing their attention using the element of surprise;
- *Stimulate curiosity*: asking questions or putting them in practical situations to stimulate curiosity;
- *Variability – Give concreteness and show the benefits:* offering a variety of means to meet the different needs and interests of students and show them the future benefits.

Relevance

The second component concerns relevance. In order to retain information, learners must perceive the experience as meaningful or important. There are several ways to ensure that the information being taught is meaningful to learners:

- *Goal orientation*: The learning objectives are communicated clearly to increase the chances of success;
- *Motivational relevance*: The learning objectives are aligned with the students' motivations;
- *Connection to personal experience*: The information being taught is connected to the students' personal experiences.

Confidence

The third component in the ARCS model is confidence. This refers to learners' own belief in their ability to achieve something and their confidence in their ability to succeed. Strategies to increase confidence can be incorporated into teaching in a number of ways:

- *Learning requirements*: learning objectives and criteria for assessing achievement are clearly outlined so that learners know what to expect;
- *Opportunities for success*: tasks are sufficiently challenging for students and they have the opportunity to succeed;
- *Personal responsibility*: the connection between success in class and the effort made by the learner is recognized.

Satisfaction

Satisfaction is crucial for continued learning success. Learners will be more motivated to learn if they are satisfied with the outcome. Teachers can promote satisfaction by implementing various strategies in the classroom:

- *Intrinsic (Internal) motivation*: the entire learning process should be enjoyable;
- *Extrinsic (External) motivation*: constructive feedback and positive comments are the norm;
- *Fairness*: there are clear standards and criteria that are applied consistently.

The ARCS Motivation Model not only clearly identifies different categories, each with different strategies for promoting engagement, but also includes a 10-step motivational design process. These steps help educators identify learning gaps and address them appropriately to ensure student success.

Steps of Motivational Design

Analyze

1) Acquire course information;

2) Acquire audience information;

3) Analyze audience motivation;

4) Analyze motivational tactics in existing instructional materials;

Design

5) Describe motivational goals and assessment methods;

6) Identify potential motivational tactics;

7) Develop motivational tactics;

8) Integrate motivational tactics with training plans;

Develop

9) Develop instructional materials and practices;

Evaluate

10) Evaluate learner response (feedback).

Overall, the ARCS model for instructional design offers a comprehensive and powerful framework for developing motivational strategies through innovative approaches and technologies. By paying attention to the key components – Attention, Significance, Confidence and Satisfaction, educational strategy designers can enhance learning effectiveness, increase learner engagement and participation, and promote student success and satisfaction.

Motivational design of a course on "Marketing and marketing information systems"

This study presents the training methods applied in the design of the course 'Marketing and Marketing Information Systems' for the 'Business Information Technologies' program at the Faculty of Mathematics and Informatics (FMI), University of Plovdiv.

The educational strategy was developed by following the ten-step sequence outlined in Keller's ARCS motivational design model. During the initial four steps, the instructor collected and analysed foundational data, including student motivations and course requirements. This phase was conducted at the beginning of the semester through targeted discussions focused on students' prior knowledge, their expectations, the specific skills they needed to acquire, and the professional utility of those skills.

Subsequently, in steps five through eight, potential motivational strategies were identified. The objective was to enhance student engagement by incorporating various innovative pedagogical approaches and diverse teaching methods into the course structure.

Learning activities – the learning activities designed for the course include **flipped learning strategies**, experiments, and class discussions, integrated with a **blended learning approach** through the Distributed Platform for e-Learning —

DisPeL [3]. This platform facilitates various assessment and self-assessment techniques, as well as blended peer review activities.

Central to this strategy is the **Flipped Classroom** model, a form of blended learning that redefines the student's role in the knowledge development process. In this model, students engage with new content independently prior to class, reviewing instructional materials in advance. This preparation ensures they arrive better equipped for in-class practical tasks, shifting the focus from passive listening to active application and collaborative problem-solving.

Practical sessions and class discussions are facilitated by the instructor, who moderates the learning process through targeted questioning, clarification of core concepts, and the oversight of practical exercises. At the outset of the course, students are presented with the comprehensive project scope, clearly outlining the final objectives and the professional relevance of the outcomes. This 'big picture' approach ensures that students understand the ultimate purpose of their efforts.

Subsequently, the instructor and students collaboratively deconstruct the project into manageable, incremental tasks. This step-by-step clarification fosters a more efficient workflow, allowing students to maintain a holistic view of the project while focusing on the specific requirements of each phase. This structured transparency significantly enhances the transition from theoretical understanding to practical execution.

Participants – 88 students majoring in BIT.

Methodology:

Implementation of blended learning. The course utilizes a **blended learning** model, where instructional materials are delivered through the **Distributed Platform for e-Learning (DisPeL)** [3] at the start of each new module. These digital resources comprise multimedia presentations, comprehensive conceptual guides, and interactive tools for both formative assessment and self-evaluation. This approach ensures that students have continuous access to foundational knowledge and can monitor their own progress independently.

Facilitation of group discussions. Interactive group discussions are a core component of the methodology. During these sessions, the instructor clarifies complex tasks and guides students in selecting **real-world business cases** that align with their professional interests. By providing constructive feedback and highlighting the advantages and disadvantages of various approaches, the instructor fosters an environment that sustains high levels of student motivation and analytical engagement.

Practical experiments. A significant portion of the course is dedicated to **practical experiments**, where students solve complex tasks by modeling authentic industry problems. Learners are required to independently apply newly

acquired knowledge and skills to these simulations. This pedagogical strategy aims to bridge the gap between theory and practice, allowing students to develop critical hands-on competencies and learn through iterative problem-solving and error analysis.

Expected learning outcomes

In addition to acquiring knowledge specific to the field, the proposed model aims to influence several other competencies such as:

- Critical and self-critical thinking, development of reflection;
- Autonomous learning (self-study);
- Formulation and analysis of problems;
- Identification of main difficulties and planning a strategy for solving them;
- Ability to analyse and synthesize information;
- Ability to make decisions;
- Creating conditions for the development of creativity.

In steps nine and ten, instructors develop the tasks themselves and then conduct an evaluation of the activity. The goal is to specifically diagnose whether the motivational strategies were effective for student learning.

In this course, each student is required to select a specific business case involving the provision of products or services. The overarching objective is to achieve business or service optimization. To attain this goal, the process is structured into a logical sequence of five distinct, progressive tasks:

1) Marketing research

- *Task*: Design a survey with logical flow and clearly defined questions and answers.
- *Goal*: Collect precise data by asking the right questions.

2) Data analysis

- *Task*: Process and format collected data into a structured, professional document.
- *Goal*: Develop data handling and analytical skills.

3) Conclusion and insights

- *Task*: Summarize findings to identify key patterns and research benefits.
- *Goal*: Enable students to recognize data-driven opportunities for business improvement.

4) Business plan and strategy development

- *Task*: Formulate concrete improvement measures.
- *Goal*: Bridge theoretical marketing concepts with the practical application of strategic planning.

5) Email advertising campaign

- *Task*: Launch a targeted email campaign to promote the optimized business or service.
- *Goal*: Finalize the marketing process and apply professional outreach tools.

The evaluation criteria were transparent and communicated to the students at the onset of the course. Each component was assessed on a scale from 1 to 5 points, based on the demonstrated depth of theoretical knowledge and the proficiency of practical skills.

The chart below illustrates the comparative growth in average performance scores following the implementation of Keller's ARCS model within the course, comparing the results of the current course with those from the previous year. These results indicate a clear upward trend in student achievement across all evaluated metrics.

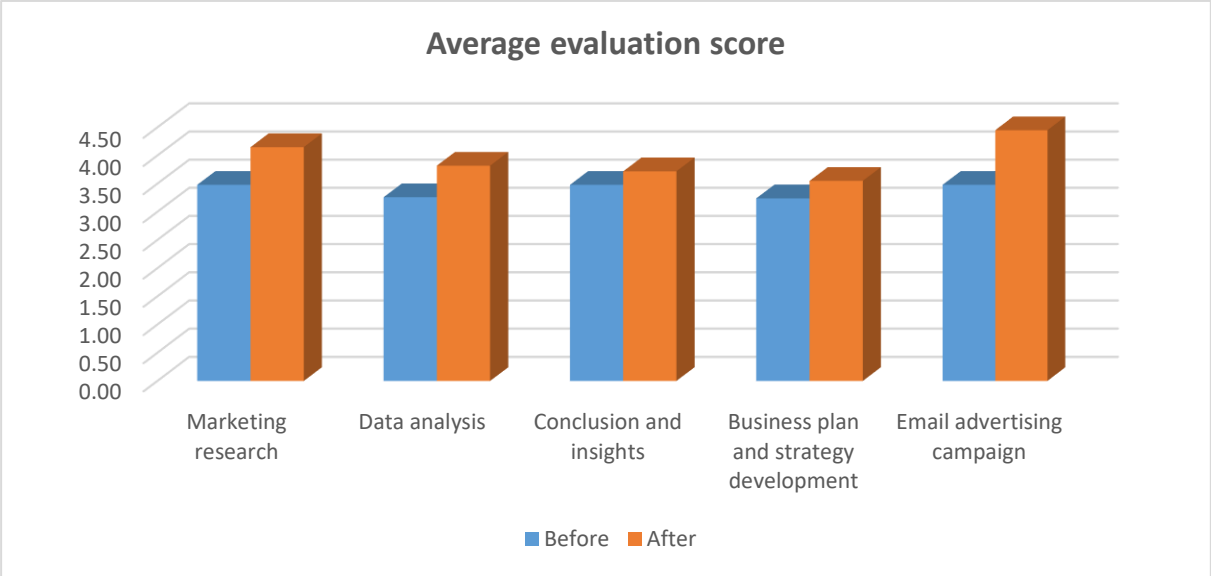

Figure 2. Average evaluation score

Conclusion

The implementation of this motivational educational strategy demonstrates that focusing on real-world outcomes significantly enhances both engagement and academic performance among computer science students. By integrating Keller's motivational design into the "Marketing and Marketing Information Systems"

course, the study shows a marked increase in student participation and proactive learning. These results confirm that such a framework is not only effective for technical disciplines but can be successfully adapted to bridge the gap between theoretical knowledge and professional practice across various academic fields. Future research could further explore the long-term impact of this model on students' career readiness and its scalability within large-scale digital learning environments.

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