

CONCEPTUAL MODELING OF AN INFORMATION SYSTEM FOR PROFESSIONAL DEVELOPMENT AND PROMOTION OF EDUCATIONAL SERVICES IN THE FIELD OF DIGITAL DESIGN

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The field of digital design is rapidly evolving amid the growing digitalization of society and increasing demand for high-quality digital content. More and more designers are turning to non-formal education, offering their own courses, webinars, and mentorship programs. At the same time, beginners often face difficulties in finding resources and communities, while experienced professionals struggle to promote their services. This creates a clear need for a specialized web platform dedicated to professional development and the promotion of educational initiatives in the design field. The project aims to create an interactive environment for collaboration, learning, and knowledge sharing.

The scientific novelty of this research lies in the development of a comprehensive solution that combines a catalog of mentors and their services, tools for promoting educational products, and communication features tailored to the design community. A conceptual model, a recommendation system algorithm, user registration and authentication mechanisms, as well as user interfaces, have been developed specifically for this project and are being introduced for the first time.

For professional designers, the platform will serve as a tool to build their personal brand, promote educational services, and attract their target audience. For beginners, it will provide access to mentors, new knowledge, and support within a community of like-minded individuals. With its robust communication system and user-friendly services, the platform will foster the growth of the design community, encourage knowledge exchange, and help all participants achieve their professional goals.

Key words: information system, information technologies, web platform, digital design, conceptual modeling, mathematical modeling, project management, professional development.

Introduction. The field of digital design is rapidly evolving amidst the ongoing digitalization of society and the growing demand for high-quality digital content and products. At the same time, an increasing number of designers are opting for informal learning paths, offering their own educational services through courses, webinars, and mentorship programs. However, beginners often face challenges in their professional growth due to the need to search for resources and information across multiple platforms, as well as the lack of a unified design community for support. For experienced professionals aiming to promote their services, difficulties and limited opportunities for effective marketing remain significant obstacles. In this context, there is a clear need to develop a specialized web platform that integrates professional development with the promotion of educational services within the digital design sphere. The project proposed in this article seeks

to create an interactive environment that fosters collaboration among designers of varying experience levels, facilitates knowledge exchange, and attracts new users to high-quality learning opportunities.

The aim of the research. The aim of this study is to develop the concept and structure of a system that facilitates effective interaction between beginner and professional designers, enables the promotion of mentorship services, and supports the development of a professional community.

Analysis of recent research and publications. The article on CulturePartnership [1] explores mentorship as an effective tool of alternative education for professionals in the creative industries, emphasizing its importance for knowledge transfer and the development of professional skills.

In study [2], it is noted that most beginners in the field of digital design choose informal learning

methods – such as courses, mentorship, and self-education. This is driven by several factors: (1) the lack of practical experience in university programs and the general shortage of such programs in Ukrainian public universities; (2) the opportunity to start a career quickly with sufficient hands-on experience and immediate access to relevant knowledge. Consequently, mentors carry a special responsibility, as they can help [3] newcomers define their career direction within the field, improve their skills and knowledge, build self-confidence, and learn how to market their services.

The importance of mentorship and the development of technologies for its implementation is addressed in studies [4–8].

Research papers [9–10] present conceptual models of information systems designed to solve various practical tasks, applying both systems-based and process-based approaches to analysis and modeling. In turn, mathematical modeling of information systems is examined in works [11–12].

Presentation of the main research material.

The system's operational process is presented as a conceptual model of an information system in Fig. 1.

System: a web platform for professional development, interaction, and promotion of educational services in the field of digital design, with a focus on one-on-one mentorship.

Supersystems: the digital design market and the market for educational services in the digital field.

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Let's consider the proposed subsystems.

1. Registration and authorization module: user registration (mentors and beginner designers); authorization via email or social media accounts; mentor verification by administrators before profile activation.

2. Personal profile module:

- Dashboard for beginner designers with booked sessions, interaction history, chats with selected mentors, and service ratings.

- Mentor dashboard featuring a public profile, session calendar, chats with mentees, and reviews of provided services.

- Public mentor pages including descriptions of professional experience, portfolios, areas of expertise, social media links, and banners promoting courses or guides.

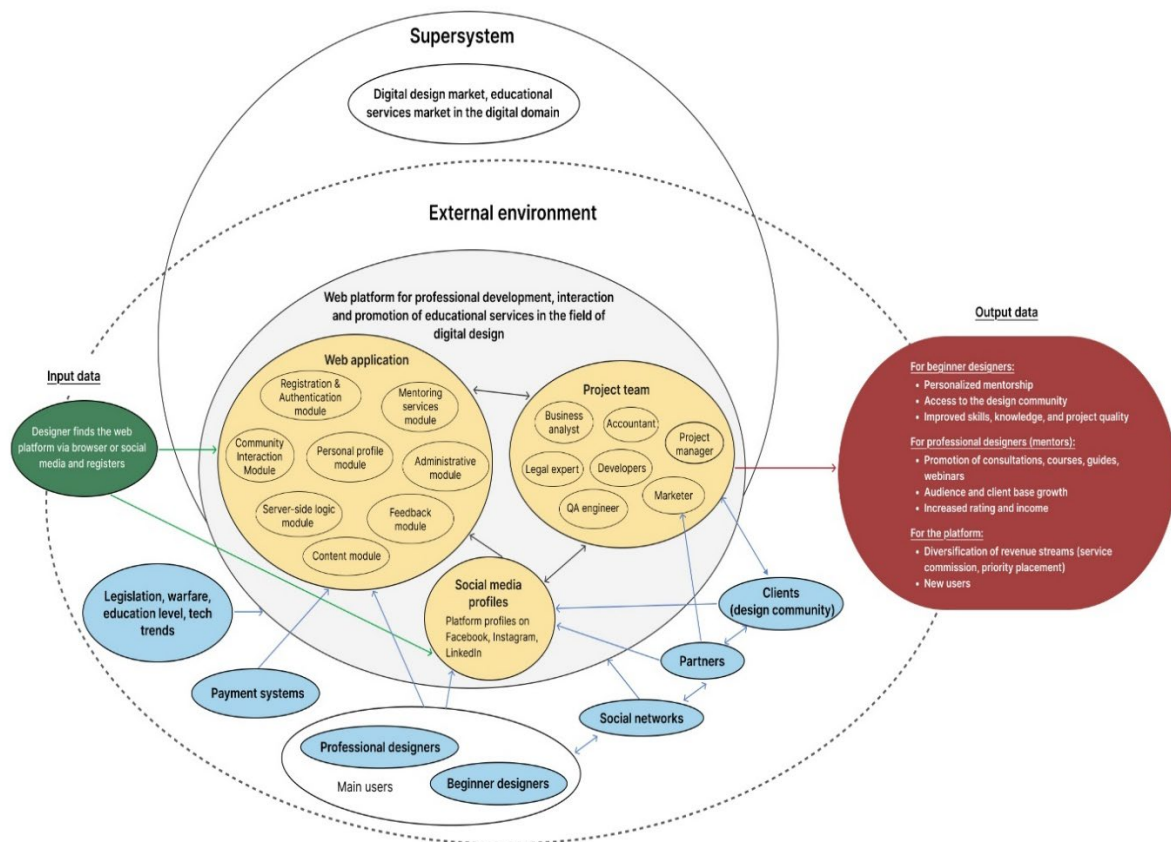


Fig. 1. Conceptual model of the information system

3. Mentorship services module: catalog of available mentors organized by specialization; calendar for booking mentorship sessions; payment processing through the platform or external services (subject to mutual agreement).

4. Content module (articles, courses, info products): ability to publish articles, guides, templates, and more; banners announcing webinars, courses, and training programs.

5. Community module (discussion/forum/chat): integration with Telegram and Discord for community interaction.

6. Rating and feedback module: ability to leave reviews after mentorship sessions or course completions; calculation of mentor ratings based on user evaluations.

7. Administrative module: content moderation; user account management; management of mentor profiles/applications; a platform analytics, including user activity, revenue, and section popularity.

8. Server logic module:

- Database management for users, sessions, profiles, transactions, and content.

- API integration with payment systems and third-party services.

- Server-side logic for handling requests, event registration, and data security.

Project social media pages: Instagram page; Facebook page; LinkedIn page.

Project team members: project manager; business analyst; developers (Frontend, Backend); QA tester; marketing specialist; accountant; legal advisor.

Clients directly involved in the project: UX/UI designers; graphic designers.

External system interactions:

1. Platform users: beginner and professional designers who register, create content, purchase services or subscriptions, and interact with one another.

2. Partners: collaboration with designers, educational institutions, and design industry influencers to promote the platform.

3. Factors to consider during platform design, development, and promotion: current legislation, ongoing military conflicts, education level (designer training quality), and technological trends (process automation, artificial intelligence, new design tools).

4. Payment systems: processing transactions.

5. Social media: used as a platform for advertising the service.

Let's formulate a mathematical model for the mentor recommendation system.

The task is defined as follows: «Find a mentor who best meets the user's needs, taking into account

the budget, convenient time, thematic relevance (design specialization and consultation goal), and the mentor's rating/quality of service».

Input sets:

- $U = \{u_1, u_2, \dots, u_n\}$ – users (beginner designers);
- $M = \{m_1, m_2, \dots, m_n\}$ – mentors;
- $T = \{t_1, t_2, \dots, t_n\}$ – time slots;
- $D_j \subseteq T$ – slots available to the mentor $s_j \in T$;
- $S_j \subseteq T$ – slots convenient for the user u_i ;
- $P(m_j) \in \mathbb{R}^+$ – mentor service cost m_j ;
- B_i – user budget u_i ;
- $R_{ij} \in [1, 5]$ – rating/quality of interaction for the pair (u_i, m_j) ;
- $K_{ij} \in [0, 1]$ – thematic relevance of the pair (u_i, m_j) .

Decision variables:

$A_{ij}(t) \in \{0, 1\}$ – 1, if the user u_i books a session with a mentor t in a given time slot t , otherwise, 0.

Constraints:

- user budget:

$$\sum_{j=1}^k \sum_{t \in T} A_{ij} \cdot P(m_j) \leq B_i. \quad (1)$$

- each user can select only one session at a given time:

$$\sum_{j=1}^k \sum_{t \in T} A_{ij}(t) \leq 1. \quad (2)$$

- the mentor cannot be booked for two appointments at the same time:

$$\sum_{j=1}^n A_{ij}(t) \leq 1, \forall_j, \forall_t. \quad (3)$$

- the mentor must be available:

$$A_{ij}(t) = 0, \text{ якщо } t \notin D_j. \quad (4)$$

- the time must be convenient for the user:

$$A_{ij}(t) = 0, \text{ якщо } t \notin S_j. \quad (5)$$

- the topic must at least partially match the user's request:

$$K_{ij} > 0. \quad (6)$$

Objective function (utility maximization). We aim to maximize the overall utility, which is based on the mentor's rating and thematic relevance:

$$\sum_{j=1}^k \sum_{t \in T} A_{ij}(t) \cdot R_{ij} \cdot K_{ij} \rightarrow \max. \quad (7)$$

Research findings. The information system under development is a client-server web application with a Single Page Application (SPA) architecture. This architecture enables fast and seamless user interaction without the need to reload the entire page

when navigating between different sections of the platform (e.g., mentor catalog, mentor profile, user dashboard, private messages, etc.).

The client-side is built using React.js, a modern library, for building user interfaces that supports real-time dynamic updates, a component-based structure, and routing capabilities, all of which are essential for SPA development. The server-side is implemented using Node.js in combination with Express.js, a minimalist framework for creating REST APIs. This choice is driven by its high performance, scalability, and extensive library ecosystem. PostgreSQL was selected as the database management system, offering robust support for relational data, data integrity, and complex queries.

These technologies were chosen for their popularity, strong community support and documentation, high level of integration, and suitability for rapid MVP (Minimum Viable Product) development within a short time frame.

The software development process is organized using the Agile methodology, specifically the Scrum approach, which involves delivering the project in a series of short iterations (sprints). This allows for the gradual implementation of key modules such as the registration module, mentor catalog, and user dashboard.

Mockups of the platform's key screens were created in the Figma environment [13]. Fig. 2 shows

the registration screen for beginners (in other words, mentees).

Fig. 3 illustrates the process of submitting a mentor registration application, which includes entering personal information, mentor details, experience, position, skills, achievements, and a description of why the user wants to become a mentor. Figure 4 shows the message a user will receive after submitting the application account creation and verification will take place upon approval by an administrator. After the form is submitted, a confirmation email will be sent to the user's email address as part of the registration and profile activation process.

Fig. 5 shows the mentor profile with key sections – about the mentor, offered services, and reviews.

Conclusions. As a result of the conducted research, a conceptual model of an information system was developed, focused on the professional development of designers and the promotion of educational services in the field of digital design. The proposed web platform integrates the functionality of an educational environment, a mentorship consultation service, and a professional community hub, enabling a comprehensive approach to the development of the design ecosystem. The platform's modules cover key processes such as user registration and verification, mentorship service management, educational content publishing, community communication, and a system of ratings and recommendations.

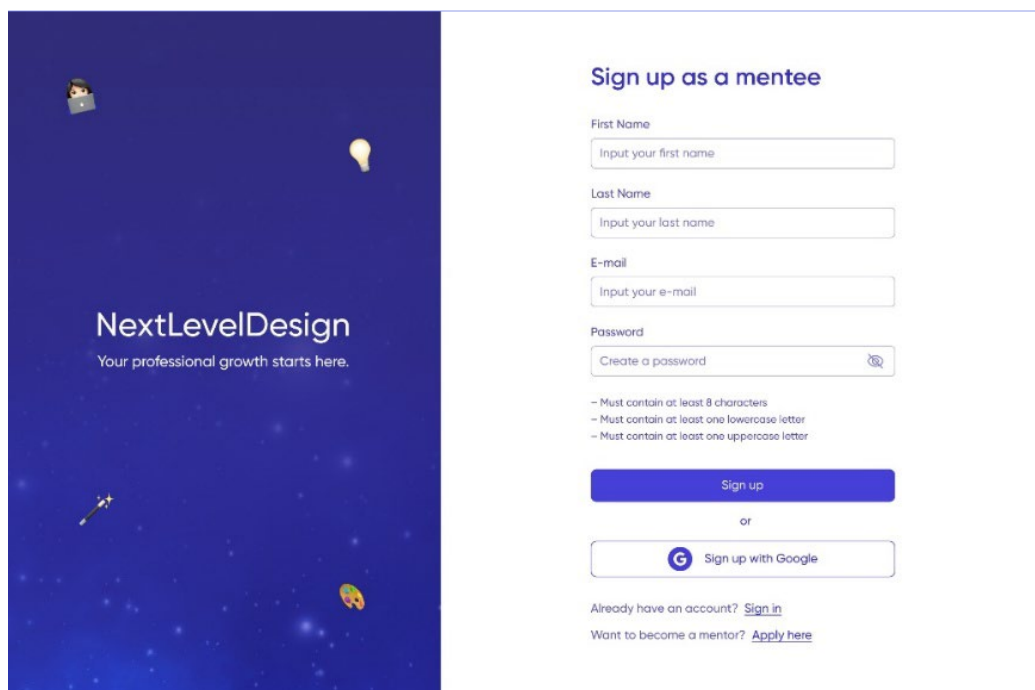


Fig. 2. Prototype of the registration screen for beginners

The screenshot shows the 'Apply for mentorship' form on the NextLevelDesign website. The form is divided into three steps: 1. Registration details, 2. About you, and 3. Why mentorship?. The first step is active and contains the following fields: Name (Input your name), Last name (Input your last name), E-mail (Input your e-mail), Password (Create a password), Position (Input your position), Work experience (Select an option), and Photo (Upload button). A 'Next step' button is located at the bottom right of the form.

Fig. 3. Mentor registration application submission

The screenshot shows the confirmation page after a mentorship application submission. The page features a 'Return to Home page' button at the top left. The main content area has a heading 'We've received your mentorship application!' followed by a message: 'We'll review your application and get back to you within 3-5 business days. You'll receive an email at yulija_design@gmail.com with further instructions.' Below this, a section titled 'What's next?' lists three actions: 'Check out our tips for mentors', 'Explore other mentor profiles', and 'Subscribe to our newsletter'.

Fig. 4. Information for the mentor after application submission

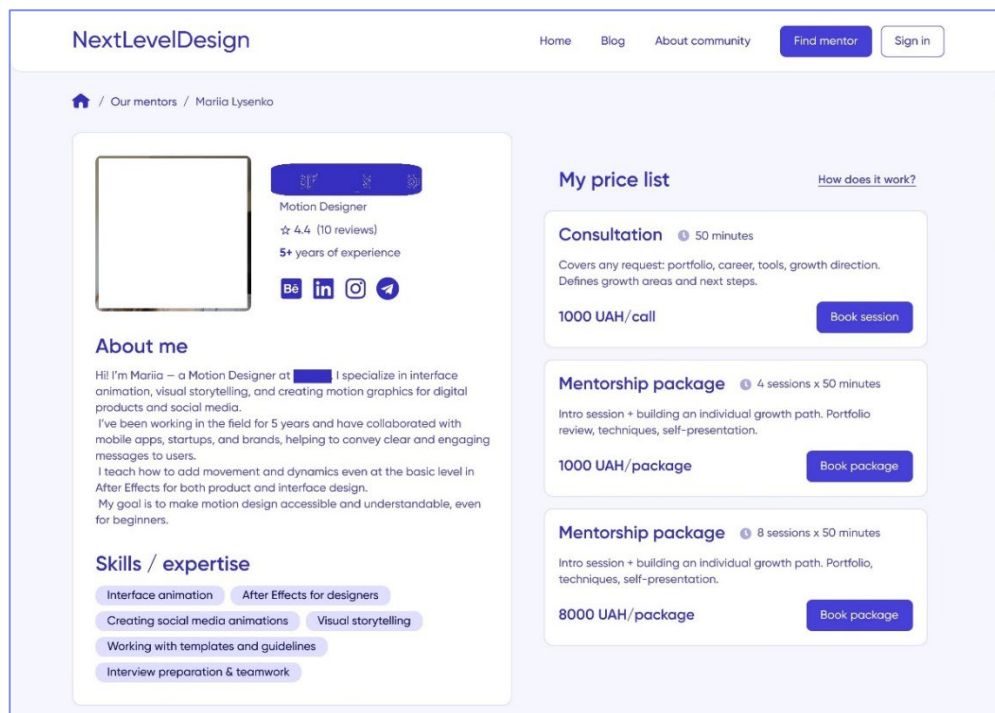


Fig. 5. Mentor profile

A particularly valuable feature is the proposed mathematical model of the recommendation system, which considers a range of criteria (budget, topic, convenient time, mentor rating) to provide a personalized selection of educational services. The technical implementation is based on modern technologies (React.js, Node.js, PostgreSQL), ensuring high performance, scalability, and ease of further system development. The use of an agile project management methodology (Agile/Scrum) allows for adapt-

ability to changes and the gradual implementation of functional components.

The results obtained have significant practical value. The developed system can be implemented as a full-fledged digital product capable of enhancing the quality of non-formal education in design, supporting the professional growth of specialists at various levels, and contributing to the formation of a sustainable and active design community in Ukraine.

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КОНЦЕПТУАЛЬНЕ МОДЕЛЮВАННЯ ІНФОРМАЦІЙНОЇ СИСТЕМИ ДЛЯ ПРОФЕСІЙНОГО РОЗВИТКУ ТА ПРОСУВАННЯ ОСВІТНІХ ПОСЛУГ У СФЕРІ DIGITAL-ДИЗАЙНУ

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Сфера digital-дизайну стрімко розвивається в умовах цифровізації суспільства та зростання попиту на якісний цифровий контент. Все більше дизайнерів обирають неформальне навчання, пропонуючи власні курси, вебінари та менторські програми. Водночас початківці стикаються з труднощами у пошуку ресурсів і спільноти, а досвідченим фахівцям складно просувати власні послуги. Це зумовлює потребу у створенні спеціалізованої веб-платформи для професійного розвитку та просування освітніх ініціатив у сфері дизайну. Проєкт має на меті сформувати інтерактивне середовище для співпраці, навчання та обміну досвідом.

Наукова новизна дослідження полягає у створенні комплексного рішення, яке поєднує каталог менторів та їх послуг, спосіб просування освітніх продуктів, а також інструменти для комунікації в дизайнерській спільноті. Розроблена концептуальна модель, алгоритм рекомендаційної системи, механізми реєстрації та авторизації, а також інтерфейси користувачів є специфічними для даного проєкту й були створені вперше.

Для професійних дизайнерів платформа стане інструментом для розвитку власного бренду, просування освітніх послуг та залучення цільової аудиторії. Початківцям платформа надасть змогу знаходити менторів, отримувати нові знання, а також підтримку у спільноті однодумців. Завдяки розвиненій системі комунікації та зручним сервісам, платформа сприятиме активному зростанню дизайнерської спільноти, обміну знаннями та досягненню професійних цілей усіма її учасниками.

Ключові слова: інформаційна система, інформаційні технології, вебплатформа, Digital-дизайн, концептуальне моделювання, математичне моделювання, управління проєктами, професійний розвиток.

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