Revista ARACÊ
ISSN: 2358-2472

BETWEEN ACADEMIC AND PROFESSIONAL LIFE: A SIMULATION OF A REAL-LIFE AGILE PROCESS FROM AN INTERDISCIPLINARY PERSPECTIVE

https://doi.org/10.56238/arev7n7-234

Date of submission: 06/22/2025 **Date of publication:** 07/22/2025

Lúcio Otávio Nunes[1]

ABSTRACT

This work aims to highlight the importance of practical experience in the professional development of undergraduate students. The simulation of real-life scenarios allows students to cultivate both technical competencies and soft skills, better preparing them for the demands of the job market. This article presents a practical simulation involving the application of an agile methodology in software development. The example aims to support a teaching approach in which practice plays a central role in students' personal and professional growth. Furthermore, it illustrates how an interdisciplinary experience can contribute both technically and pedagogically to higher education.

Keywords: Scrum. Agile. Simulation and Learning.

ENTRE A VIDA ACADÊMICA E PROFISSIONAL: UMA SIMULAÇÃO REAL DE UM PROCESSO ÁGIL SOB UMA PERSPECTIVA INTERDISCIPLINAR

RESUMO

Este trabalho tem como objetivo destacar a importância da experiência prática no desenvolvimento profissional de estudantes de graduação. A simulação de cenários da vida real permite que os estudantes desenvolvam tanto competências técnicas quanto habilidades interpessoais, preparando-os melhor para as demandas do mercado de trabalho. Este artigo apresenta uma simulação prática envolvendo a aplicação de uma metodologia ágil no desenvolvimento de software. O exemplo visa fundamentar uma abordagem de ensino na qual a prática desempenha um papel central no crescimento pessoal e profissional dos estudantes. Além disso, ilustra como uma experiência interdisciplinar pode contribuir técnica e pedagogicamente para o ensino superior.

Palavras-chave: Scrum. Ágil. Simulação e Aprendizado.

ENTRE LA VIDA ACADÉMICA Y LA PROFESIONAL: UNA SIMULACIÓN REAL DE UN PROCESO ÁGIL DESDE UNA PERSPECTIVA INTERDISCIPLINAR

RESUMEN

Este artículo busca destacar la importancia de la experiencia práctica en el desarrollo profesional de los estudiantes de pregrado. Simular situaciones reales permite a los estudiantes desarrollar habilidades técnicas e interpersonales, preparándolos mejor para las exigencias del mercado laboral. Este artículo presenta una simulación práctica que implica la aplicación de una metodología ágil en el desarrollo de software. El ejemplo busca respaldar un enfoque docente donde la práctica juega un papel central en el crecimiento personal y profesional de los estudiantes. Además, ilustra cómo una experiencia interdisciplinaria puede contribuir técnica y pedagógicamente a la educación superior.

[1] PhD in Chemistry. Federal University of Jequitinhonha and Mucuri Valleys. E-mail: lucio.otavio@ufvjm.edu.br
ORCID: https://orcid.org/0000-0003-3707-2633 LATTES: http://lattes.cnpq.br/1085902983249064

Revista ARACÊ
ISSN: 2358-2472

Palabras clave: Scrum. Agilidad. Simulación y Aprendizaje.

Revista ARACÊ
ISSN: 2358-2472

1 INTRODUCTION

Professional education is essential for the development of every country and society. Economies require qualified professionals capable of driving innovation, applying new technologies, and generating wealth. However, there remains a persistent challenge in delivering well-prepared professionals to the labor market. This is largely due to the gap between academic training and the real-world demands of professional practice. Many students graduate without having experienced the practical context of their field, entering the workforce with significant skill deficits (KOLMOS; HADGRAFT; HOLGAARD, 2016).

To bridge this gap, several approaches can be considered. One would be to reformulate university curricula entirely, but such a change would demand substantial time and resources. An alternative is to promote curricular flexibility by incorporating more practical and project-based learning opportunities. Hands-on experience, supported by the development of professional artifacts, can help students gain confidence and serve as didactic tools for teaching in professional programs (PRINCE; FELDER, 2006).

This lack of practical experience is also evident in the field of software engineering, where methodologies have evolved over time and the demand for qualified professionals remains high. One notable example of this evolution is the traditional paradigm of software development, particularly the waterfall model, which proved to be inflexible and contributed to what became known as the "software crisis" in the 1970s. This sequential approach to development was well-suited to industrial production but poorly adapted to the dynamic and iterative nature of software. As modern societies became faster-paced and more complex, a more flexible, dynamic, and integrated methodology became necessary (PRESSMAN, 2005).

In response, agile methodologies began to emerge in the late 1990s and early 2000s. These include frameworks such as Scrum, Extreme Programming (XP), Test-Driven Development (TDD), and the Crystal Method. While each has unique features, they share core principles: iterative development, teamwork, and rapid delivery. The primary goal is to accelerate the release of functional software without compromising quality (SCHWABER; SUTHERLAND, 2020).

Agile methodologies are also characterized by their emphasis on the use of visual and conceptual modeling tools that assist in software design prior to implementation. These tools include UML diagrams (such as class diagrams, activity diagrams, and sequence diagrams), as well as artifacts like user stories and use case diagrams. Such components allow for flexible development even in changing environments, while maintaining continuity throughout the process. Additionally, methods

Revista ARACÊ
ISSN: 2358-2472

like Scrum promote recurring planning and review meetings (sprints, sprint reviews, daily scrums), enabling faster, more collaborative delivery cycles (AMBLER, 2002).

In this context, the present work describes an educational experience in which a group of university students simulated the development of an application for a cupcake store. This project provided an opportunity for students to engage with professional practices while developing both soft and hard skills — essential competencies for building a career in today's job market (ADAMS BECKER; CUMMINS; DAVIS; FREEMAN *et al.*, 2017).

In addition to offering practical experience, the objective of this work is to evaluate the effectiveness of agile methodologies in teaching software requirements and modeling. Agile approaches are widely adopted in industry today, aligning well with the demands of a fast-paced and ever-evolving world. This study therefore aims not only to support the use of agile methods in education, but also to validate their continued relevance to contemporary software development paradigms (DINGSØYR; NERUR; BALIJEPALLY; MOE, 2012).

2 METHODOLOGY

The project began with the formation of a development team composed of seven students in the final years of a Software Engineering undergraduate program. All activities were carried out collaboratively by the team, either in the university environment or through digital communication and collaboration tools such as video calls, virtual meetings, task management platforms, and email. These tools were essential for maintaining communication, organizing responsibilities, and tracking progress throughout the project.

The team adopted the Scrum framework as the agile methodology to guide the development process. Initially, the project objective was defined: to simulate the development of a mobile application for a cupcake store. Once the scope was established, the team was structured into specific roles, and a strategy was outlined to divide the project into two development sprints, consistent with Scrum principles.

During the first sprint, the focus was on gathering and organizing the general requirements and project planning components. The team created user stories to represent client needs and expectations, developed a use case diagram, and expanded these into detailed use case descriptions. A product backlog was established to prioritize features, and a task management system was implemented to allocate responsibilities and monitor deadlines.

In the second sprint, the team concentrated on developing more advanced and technical artifacts. These included a class diagram to represent the system's structure, a sequence diagram to

Revista ARACÊ
ISSN: 2358-2472

illustrate object interactions, and a state machine diagram to model system behavior. Additionally, the team designed user interface prototypes through wireframes to better understand and communicate the logical flow of the application.

Throughout both sprints, the students engaged in collaborative discussions, review sessions, and retrospectives to assess their progress and adjust their strategies as needed. This iterative and adaptive approach aimed to mirror real-world software development practices and allowed the students to apply both their theoretical knowledge and interpersonal skills in a realistic scenario.

3 RESULTS

Once the project requirements were established through stakeholder interviews, on-site observations, and the completion of elicitation forms, the team proceeded to the development of the project artifacts. The initial step involved collecting and documenting all user stories related to both internal operations and customer-facing functionalities.

These user stories were categorized into three main groups: those associated with the cupcake store's staff, those describing essential services offered to clients, and those involving optional or supportive features. Each story captured a specific need from the perspective of a particular user role, such as producers, sales staff, or end users.

Table 1

User stories related to workers of the cupcake shop

ID	HU01_01
Title	Verification of Orders Placed Outside Business Hours
Requester	Production Staff
Action	As a producer, I need access to orders placed outside regular business hours
ID	HU01_02
Title	Verification of Orders Placed During Business Hours
Requester	Production Staff
Action	As a producer, I need access to orders placed during regular business hours
ID	HU01_03
Title	Order Type: Delivery or In-Store Consumption
Requester	Sales Staff
Action	As a sales staff member, I need to know whether the order will be delivered or consumed in-store

Revista ARACÊ
ISSN: 2358-2472

Table 2

User stories related to essential client services

ID	HU01_04
Title	Purchase via App
Requester	Client
Action	As a consumer, I want to make a purchase using the app.
ID	HU01_06
Title	Product Delivery
Requester	Client
Action	As a consumer, I want my product to be delivered
ID	HU01_07
Title	Product Selection
Requester	Client
Action	As a consumer, I want to be able to choose any product from the store
ID	HU01_08
Title	Payment Method
Requester	Client
Action	As a consumer, I want to choose a payment method for the selected product
ID	HU01_09
Title	App Installation
Requester	Client
Action	As a consumer, I want to install the app on my cellphone
ID	HU01_10
Title	App Account Creation
Requester	Client
Action	As a consumer, I want to create an account in the app

Table 3

User story related to non-essential client services

ID	HU01_05
Title	Client Feedback
Requester	Client
Action	As a consumer, I want to evaluate and provide feedback on the service provided

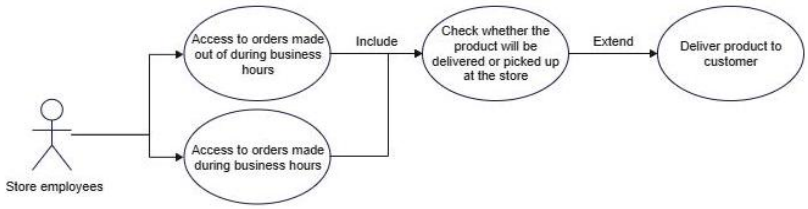
Following the elaboration of the user stories, a use case diagram was created to offer a visual representation of system interactions. This was further developed into a detailed use case narrative that mapped the complete customer journey for placing an order via the mobile application and how the workers act in this case. The expanded use case included preconditions, postconditions, a basic flow of actions, and alternative flows that addressed common variations in customer behavior.

Revista ARACÊ
ISSN: 2358-2472

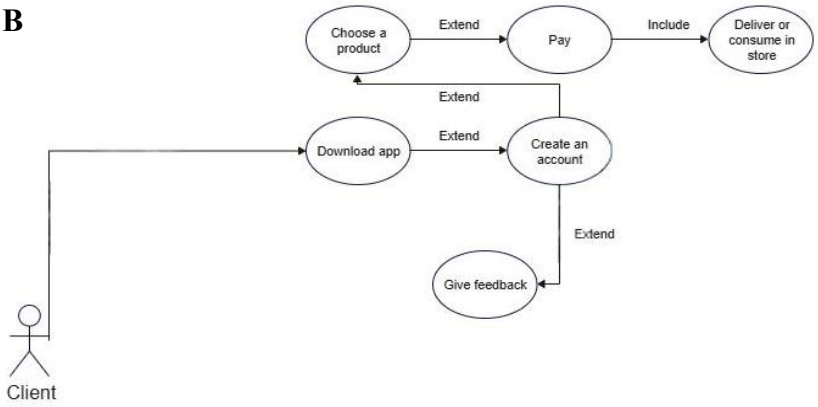
Image 1

Use case diagrams – Store employees (A) and cliente (B)

A



B



Here follows the expanded user case diagram:

Expanded Use Case Diagram of the System

Name: Making a purchase through the app

Identifier: HU01_04

Description: Allows the user to purchase a selected product via the cupcake store's mobile app

Preconditions: A product must be selected before the purchase process begins

Postconditions: Once the product is selected, payment must be completed

Basic Flow of Events

1. The use case begins when the customer downloads the cupcake store's app.
2. The customer registers and creates an account.
3. *(Alternative Flow – Alpha)* The customer proceeds to make a purchase using the app.
4. The customer selects a product from the store catalog.
5. The customer chooses a payment method and completes the payment.
6. After payment, the customer selects either home delivery or in-store pickup. Orders placed after 10:00 PM will be delivered the next day.

Business Rule: The physical store operates from 9:00 AM to 10:00 PM.

Revista ARACÊ
ISSN: 2358-2472

7. The product is either delivered to the customer or picked up in-store.

Alternative Flow – Beta: Purchase Not Completed

8. The customer selects a product but does not proceed with the payment.
9. The customer exits the app without completing the purchase.

Alternative Flow – Gamma: Customer Feedback

10. The customer decides to send feedback to the company.
11. The customer clicks the "Feedback" option in the app.
12. The customer is redirected to a feedback screen, writes their message, and submits it.
13. The customer then closes the app.

To support systematic planning and effective task prioritization, a product backlog was constructed based on the user stories. Each item in the backlog was assigned a priority level and a corresponding point value to guide sprint planning and workload distribution. This structured backlog served as the foundation for managing the development tasks throughout the project lifecycle.

Table 4

Product backlog based on user stories

ID	User Story	Points	Priority
HU01_09	As a consumer, I want to install the app on my cellphone.	5	1
HU01_10	As a consumer, I want to create an account in the app.	5	2
HU01_07	As a consumer, I want to be able to choose any product from the store.	5	3
HU01_08	As a consumer, I want to choose a payment method for the selected product.	5	4
HU01_04	As a consumer, I want to make a purchase using the app.	5	5
HU01_06	As a consumer, I want my product to be delivered.	5	6
HU01_01	As a producer, I need access to orders made outside of business hours.	5	7
HU01_02	As a producer, I need access to orders made during business hours.	5	8
HU01_03	As a sales staff member, I need to know whether the order will be delivered or consumed on-site.	3	9
HU01_05	As a consumer, I want to rate the service provided.	3	10

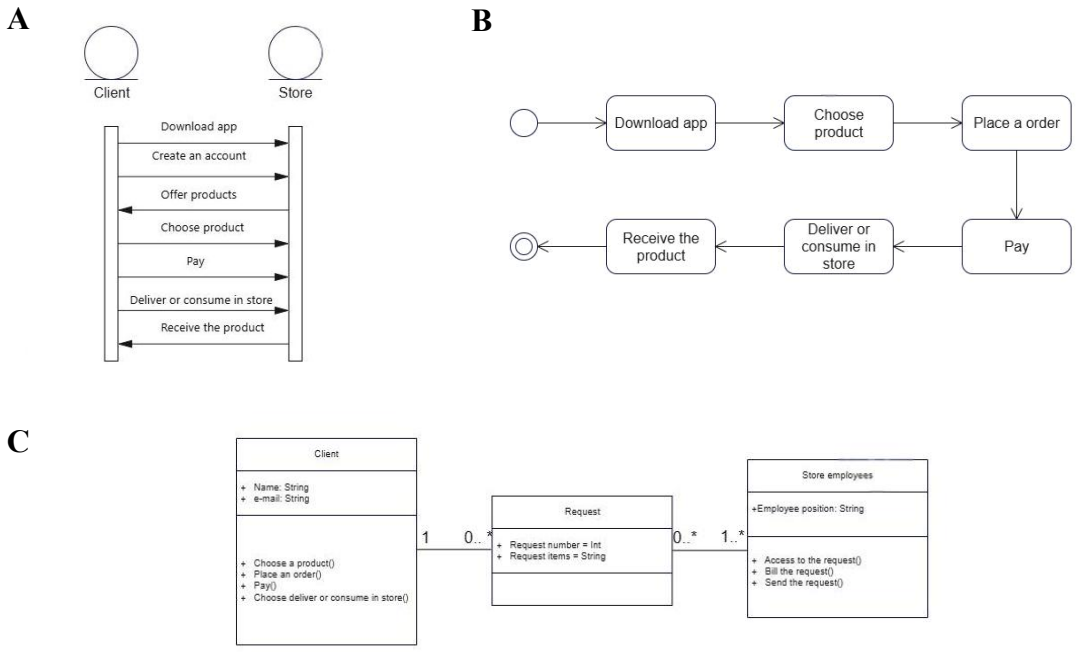
Revista ARACÊ
ISSN: 2358-2472

This progression—from user story collection to use case modeling and backlog prioritization—established a clear and organized development process. It ensured that user needs were consistently translated into system requirements, anchoring each development phase in real-world usage scenarios.

Once the static elements of the project were completed during the first sprint, the second sprint focused on developing dynamic components. To visualize user interaction flows within the app, the team created a sequence diagram, a state machine diagram and a class diagram. These tools highlighted the increasing complexity of the system and illustrated the necessity of dividing product backlog requirements into multiple sprints.

Image 2

Dynamic and static diagrams – sequence (A), state machine (B) and class (C)

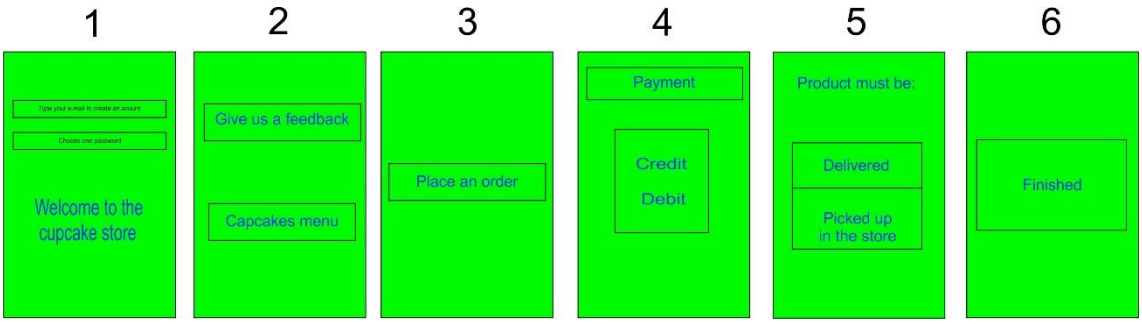


In the final phase of the second sprint, a wireframe of the application was developed to give stakeholders a visual preview of the user interface and experience prior to full implementation. Although the product was not yet finalized, this prototype allowed stakeholders to anticipate functionality and confirmed that effective organization and sprint planning can yield tangible and structured results even in a simulated environment.

Revista ARACÊ
ISSN: 2358-2472

Image 3

Wireframes for the project



4 DISCUSSION

The main objective of this project — to simulate a real-world software development process using agile methodologies — was successfully achieved. The participating students were able to experience what it is like to work on a professional software development team, applying both technical and interpersonal skills in an integrated and goal-oriented environment. This type of hands-on experience proved to be a vital supplement to traditional classroom instruction, bridging the gap between theoretical knowledge and real-world practice.

Traditionally, the Brazilian higher education system has focused primarily on the academic experience of students. As a result, there are significant gaps in the development of professional competencies. Examples such as the one presented in this work can help mitigate this deficit in current university education models (LACERDA; SANTOS, 2018).

Throughout the project, students engaged in tasks that reflect real professional environments. They were required to manage time effectively, delegate and monitor responsibilities, maintain clear communication, and adapt to shifting priorities — all of which are essential aspects of working in software development teams. These soft skills proved to be just as crucial as the technical ones, contributing to the students' holistic development and better preparing them for both the job market and their broader personal growth.

On the technical side, students produced essential deliverables such as user stories, use case diagrams, wireframes, and UML models (including class, sequence, and state machine diagrams). These artifacts functioned not only as documentation tools but also as cognitive aids for refining the team's understanding of user requirements and system functionality. Their creation required logical thinking, abstraction, and structured planning — core skills in the field of software engineering.

The use of Scrum methodology was also highly effective. It fostered incremental progress, frequent feedback, and collaborative problem-solving. Dividing the project into two sprints gave

Revista ARACÊ
ISSN: 2358-2472

rhythm to the development process and promoted a steady workflow. Periodic check-ins and retrospectives supported an iterative environment, where obstacles were openly discussed and promptly addressed.

A noteworthy aspect of the experience was that students genuinely faced the challenges of a professional setting. Organizing a team, managing time and project scope, and defining responsibilities were all mentioned by the students as difficult but essential tasks. This allowed them to understand firsthand the real demands of professional environments and the importance of interpersonal competencies in project execution.

In addition to the challenges described in this work, Andrade and colleagues (ANDRADE; BRITO; LIMA, 2016) also reported a successful experience using Scrum in a practical software engineering course. Their findings reinforce the relevance and flexibility of agile methodologies in academic settings and validate the potential of project-based learning.

One crucial insight from this educational initiative is that it fosters not only technical competence but also personal development. Students were encouraged to strengthen their sense of identity and autonomy, positioning themselves not just as future professionals, but as reflective, ethical, and collaborative individuals. This aligns with the idea that the role of education is not limited to training technical specialists but to forming human beings in an integrated and holistic way.

Learning through real-life problem solving helps students develop self-awareness, autonomy, and critical thinking — essential qualities for navigating professional and civic life. Although this approach is not yet widespread, some universities have begun to adopt problem-based learning methodologies. However, the integration of these strategies with new technologies still presents a challenge for educators (DE CAMARGO RIBEIRO, 2022).

It is important to acknowledge that this experience had limitations, such as the reduced scope and the short time available for its execution. Moreover, the project represents an academic simulation rather than an implementation in a real business context. Still, the primary goal was to report a successful case that demonstrates the feasibility and pedagogical value of integrating theory and practice in software engineering education. Despite its modest scale, the experience suggests that simple, well-structured initiatives can significantly enhance students' professional and personal development.

Overall, this initiative confirmed the strong pedagogical potential of incorporating agile-based projects into undergraduate curricula. Students not only learned how software is developed in practice but also experienced the advantages of agile methodologies widely adopted in industry. Future implementations of similar practices are strongly encouraged, particularly in educational programs

Revista ARACÊ
ISSN: 2358-2472

aiming to foster not only technical and interdisciplinary skills, but also human values essential for the formation of engaged and capable citizens.

5 CONCLUSION

Considering all that has been discussed, it becomes clear that practical experience is essential for the formation of competent professionals. However, the current educational system still faces challenges in preparing graduates with the real-world experience needed to transition smoothly into the job market. The solution does not lie in a complete overhaul of the system, but rather in its adaptation — through the integration of practical, project-based initiatives within the classroom.

Such efforts help students develop both technical (hard) and interpersonal (soft) skills in simulated professional environments that reflect the realities of the workplace. The success of these initiatives also depends on the creativity and commitment of educators to innovate within their teaching practices.

Ultimately, the integration of agile methodologies into academic settings does more than enhance technical learning: it transforms education into a holistic, human-centered, and future-oriented endeavor — one that prepares students not only to work, but to think, collaborate, and grow as individuals.

REFERENCES

Ambler, S. (2002). Agile modeling: Effective practices for extreme programming and the unified process. John Wiley & Sons.

Andrade, B., Brito, M., & Lima, C. (2016). Metodologia Ágil Scrum em uma disciplina de Engenharia de Software. SBC, 251–260.

Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., & Ananthanarayanan, V. (2017). NMC Horizon Report: 2017 Higher Education Edition. New Media Consortium.

de Camargo Ribeiro, L. R. (2022). Aprendizagem baseada em problemas (PBL): Uma experiência no ensino superior. Edufscar.

Dingsøyr, T., Nerur, S., Balijepally, V., & Moe, N. B. (2012). A decade of agile methodologies: Towards explaining agile software development. Journal of Systems and Software, 85(6), 1213–1221. https://doi.org/10.1016/j.jss.2012.02.033

Kolmos, A., Hadgraft, R. G., & Holgaard, J. E. (2016). Response strategies for curriculum change in engineering. International Journal of Technology and Design Education, 26(3), 391–411. https://doi.org/10.1007/s10798-015-9319-y

Revista ARACÊ
ISSN: 2358-2472

Lacerda, F. C. B., & Santos, L. M. d. (2018). Integralidade na formação do ensino superior: Metodologias ativas de aprendizagem. Avaliação: Revista da Avaliação da Educação Superior (Campinas), 23(3), 611–627. https://doi.org/10.1590/S1414-40772018000300003

Pressman, R. S. (2005). Software engineering: A practitioner's approach (6th ed.). Palgrave Macmillan.

Prince, M. J., & Felder, R. M. (2006). Inductive teaching and learning methods: Definitions, comparisons, and research bases. Journal of Engineering Education, 95(2), 123–138. https://doi.org/10.1002/j.2168-9830.2006.tb00884.x

Schwaber, K., & Sutherland, J. (2020). The Scrum guide: The definitive guide to Scrum: The rules of the game. Scrum.org. https://www.scrumguides.org/docs/scrumguide/v2020/2020-Scrum-Guide-US.pdf