
A Proposed Methodology for Effective Erasmus+ Projects in the Realm of eLearning

María Goretti Alonso de Castro¹ and Francisco José García-Peñalvo²

¹ *Doctorado en Formación en la Sociedad del Conocimiento (Grupo de Investigación GRIAL), Universidad de Salamanca, Salamanca, España,*

² *Grupo de Investigación GRIAL, Departamento de Informática y Automática, Instituto Universitario de Investigación en Ciencias de la Educación (IUCE), Universidad de Salamanca, Salamanca, España*

Abstract

This article unveils a study conducted on European educational projects falling under the Erasmus+ umbrella, categorized as exemplars of good practice, and linked to electronic learning or the integration of Information and Communication Technologies (ICT) in education. These research initiatives span diverse educational sectors and propose ICT-driven learning frameworks that engage both students and educators, using the methodology of systematic review of research projects that provides a scientific method with clear stages. The garnered findings have led to the developing of a methodological framework slated for presentation within the researcher's doctoral thesis. Furthermore, this framework will be accessible through a website, open to all interested parties. Given their status as exemplar projects, this research has a dual role: facilitating the utilization and dissemination of the resources cultivated in these projects while also serving as an inspirational wellspring for novel projects in similar veins. Noteworthy within projects that have stood the test of time are their genuine utility for the targeted educational communities, the deployment of pioneering methodologies involving both teachers and students and their successful implementation within participating institutions.

Keywords

Education, good practices, European projects, Technology, Interactive learning environments

1. Introduction

Our contemporary society is marked by rapid volatility, necessitating a constant drive for adaptation to sustain productivity and competitiveness. Education is responsible for equipping individuals with the apt training to meet these ever-evolving demands. In this context, the significance of continuous education is mounting, with electronic learning (eLearning) and the utilization of Information and Communication Technologies (ICT) emerging as crucial aids [1]–[4].

In this overarching context, educators stand as the linchpin for achieving efficacy within any educational framework. Teachers can ensure that students acquire the essential proficiencies for their professional journeys by cultivating a conducive learning environment through active methodologies that foster creativity. This entails devising practices centred around the student's perspective and formulating educational strategies that imbue value and support within the teaching-learning continuum. Notably, at the university level, integrating computational thinking and providing diversified learning avenues tailored to individual learning proclivities through gamified environments have proven instrumental in enhancing motivation and curbing attrition, all without compromising the quality of instruction [5].

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EMAIL: malonsca@gmail.com (A. 1); fgarcia@usal.es (A. 2)

ORCID: 0000-0003-4745-9364 (A. 1); 0000-0001-9987-5584 (A. 2)



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Recognizing education's pivotal role in fostering economic and social progress, its alignment with labour market requisites is paramount. With the imminent proliferation of technology's presence across various facets of our personal and professional lives, students possess many tools accessible via mobile phones and other electronic devices. Given the ubiquity of Internet access and the diverse array of options at hand, a departure from conventional educational paradigms becomes necessary. The shift entails transcending the mere transmission of knowledge and embracing a dynamic and interactive pedagogical approach that capitalizes on these burgeoning technologies available to all [6].

Fresh research endeavours and projects are being conceived and executed daily within educational institutions to confront these challenges head-on. In this context, it is noteworthy to emphasize the international initiatives crafted under the framework of the Erasmus+ Program. These initiatives involve diverse educational institutions from various countries collaborating on subjects of mutual interest. These projects stand as potential models, offering the opportunity for emulation within analogous educational institutions while also warranting investigation. The Erasmus+ Project Results Platform (E+PRP- <https://bit.ly/3sZMYXt>) serves as a repository for all program-related projects, categorized with various forms of recognition, including those acknowledged as good practices. Good practices denote innovative measures with solutions to specific issues, yielding enhancements [7]. However, it is imperative to recognize that these actions are context-dependent, contingent on subjects and environments, thus necessitating meticulous analysis for seamless adaptation to distinct settings [8].

For these reasons, delving into classroom-tested projects can serve as a valuable wellspring for inspiring the formulation of fresh initiatives, provided they are tailored to the specific realities of their implementation milieu. Consequently, this article delineates the methodology employed to assess Erasmus+ good practice projects in the realm of eLearning or ICT, along with showcasing instances that successfully navigate all research phases [9]–[12].

The ensuing sections encompass the theoretical background, methods (the approach adopted for reviewing Erasmus+ good practice projects tied to eLearning or ICT), results, discussions, conclusions, and references.

2. Theoretical Background

The ever-evolving landscape continuously shapes the educational system, obliging it to respond to societal demands while nurturing competent citizens. Amidst this flux, administrations, foundations, universities, and educational institutions are responsible for meeting these needs and ensuring inclusivity within this trajectory [13].

To align the educational system with societal requisites, it becomes imperative to equip both educators and institutions with tools that empower them to conceive and execute enriching projects bolstered by prospects of success. An avenue to enhance this teacher and institutional readiness is the availability of exemplars of good practices and methodologies that have exhibited efficacy. These exemplars serve as guiding lights for shaping pedagogical practices with a measure of assurance [14]–[16].

The outbreak of the COVID-19 pandemic has spotlighted numerous deficiencies within the system, catalysing a genuine digital revolution with many proposed examples and strategies that educational institutions can draw upon [17].

Within the realm of digitization, the widespread utilization of mobile phones has rendered them a potent tool for fostering learning. Mobile learning (mLearning) [18] presents an avenue to augment learning prospects in remote communities, facilitating training delivery through the devices that individuals interact with daily. However, the landscape of mLearning is dotted with challenges, encompassing aspects like underdeveloped infrastructure in remote or rural areas and limited preparedness and access to Information and Communication Technologies (ICT). Overcoming these barriers is paramount to ensure the inclusivity of this methodology's benefits [19]. Furthermore, it is imperative to forge an innovative approach to educational content grounded in Campo's meticulously crafted curriculum [20]. An effective execution also hinges on robust teacher training initiatives, bearing in mind that teachers, as guiding forces in the learning process, are pivotal agents in the

educational puzzle. Nevertheless, it is crucial not to lose sight of the necessity to invest in infrastructure and bridge the gaps in ICT and educational access [21], [22].

Understanding the characteristics of students is pivotal for crafting well-designed and aptly applied educational practices. This leads to developing strategies focused on digitization. A strategy conducive to learning is integrating games into education [23]. This approach delves into the nexus between students' physical well-being and digital technologies, delineating games' role in aiding or impeding learning. The pressure to excel, and the pursuit of perfection, at times, can hinder the learning journey. Similarly, making informed decisions underpinned by critical thinking and sound reasoning is indispensable. Hence, inculcating the capability to safeguard one's health and well-being through the judicious utilization of technology while being vigilant against potential harm born of ignorance takes precedence [24].

Within the Spanish context, connectivity rates are commendable in the face of digitization and are among the top three in the European Union (EU). However, resource utilization is inconsistent with high network infrastructure and connectivity levels. Moreover, advanced data mining and artificial intelligence technologies remain underexplored [25]. Concerning educational institutions, while connectivity levels are adequate, marked disparities surface between rural and urban areas. There are conspicuous discrepancies in the digital proficiency of teachers, which in turn affects their ability to engage in classroom projects, compounded by an evident scarcity of educational digital resources [26].

It is evident that the imperative for adequate resources and training stands apparent. It is imperative that teachers and educational personnel possess the capacity to formulate and execute impactful educational projects that tangibly enhance the skills of their target audience. This forms the backdrop against which this document unveils a study to craft a methodological blueprint for project design, enabling effective resource utilization, based on the bedrock of Erasmus+ projects categorized as good practices and successful experiences.

This impetus has spurred the undertaking of a doctoral thesis, delving into the scrutiny of Erasmus+ educational initiatives intertwined with ICT and/or eLearning. The central aim is to formulate a methodological framework that guides the design and execution of potent educational projects, as explained in the following sections.

3. Methods

The scope of this research extends beyond the collection of quantitative data alone, which includes database information, surveys, tests, and the like. Equally essential is incorporating qualitative data analysis involving texts, interviews, focus groups, and more.

To address this, the doctoral pursuit adopts a mixed methodology framework that combines both types of analysis [27]. This approach entails amalgamating quantitative and qualitative data collection, capitalizing on the strengths inherent to each type to address the research questions [28], [29].

The sequential explanatory design, deemed most fitting for this doctoral thesis, involves a logical progression in data collection and analysis [27]. The process starts with collecting and analysing quantitative data, primarily emphasising this phase. Once this step is concluded, the collection and analysis of qualitative data ensue. During the interpretation phase, insights garnered from both data types converge, fostering a more comprehensive grasp of the phenomenon under examination.

In this specific study, the following endeavours were undertaken:

- Quantitative assessment of shared factors that have influenced the triumph of various Erasmus+ educational projects, recognized as exemplars of good practice, utilizing eLearning and ICT.
- Qualitative analysis of how these projects' implementation, outcomes, and long-term viability can furnish guidelines for ensuring exceptional quality in forthcoming initiatives.

Integrating both quantitative and qualitative evaluations facilitates the attainment of more refined conclusions about the research subject. On one side, it permits data analysis derived from responses to closed questions framed in an open-ended manner.

3.1. Research stages

The research process was unfolded across three distinct stages:

1. Exhaustive Literature Review: Initially, an in-depth exploration of the subject matter will be conducted from an academic standpoint.
2. Erasmus+ Project Study: Examining Erasmus+ projects utilizing eLearning or ICT will be undertaken. The objective is to develop a model encapsulating pivotal factors for achieving project success.
3. Quantitative and Qualitative Analysis: The third stage adopts a dual-pronged approach. First, a quantitative analysis will be executed through surveys. Subsequently, a qualitative analysis will be conducted via interviews and focus groups.

3.1.1. Exhaustive Literature Review

The purpose of this stage is to see the publications made on the study's target topic and assess its relevance.

Analysing different databases of publications (Scopus, Google Scholar, Science Direct, etc.), it was observed that there were hardly any previous studies on the topic object of this research. Therefore, it was highly relevant to perform it.

A complete detail of this phase could be read in the doctoral thesis that will be published in September 2023.

3.1.2. Systematic Research Projects Review

As the underpinning approach for the research methodology, the Systematic Research Projects Review (SRPR) method has been harnessed [30]–[32].

This process encompasses four key phases: study definition, selection definition, project selection, and analysis (see Figure 1).



Figure 1: Phases for the revision of projects with SRPR methodology

As a result of applying this methodology, the sample was obtained, and the first analyses of the projects of interest were carried out with the data available on the Erasmus+ Project Results Platform (E+PRP).

It was possible to obtain preliminary information about the projects that would collect more data a posteriori, with direct contact with the selected project coordinators.

In short, this methodology helped to carry out a systematic and rigorous review of the projects to make the appropriate decisions for the research.

3.1.3. Analysis phases

Following the preliminary stages of the project search, the delineation of sampling characteristics, and the application of filters, the subsequent analysis was compartmentalized into four phases (see Figure 2):

1. **Initial In-depth Review:** Primarily, an exhaustive scrutiny of E+PRP project data was conducted, encompassing outcomes, participating institutions, and more. The foundation for this research commenced with the Erasmus+ project database (E+PRP), forming the bedrock for project sampling identified as good practice linked to e-learning or ICT use in education. This catalysed the creation of an initial research database featuring projects spanning diverse educational sectors within KA1 and KA2 actions [33], [34].
2. **Questionnaire Design and Distribution:** A questionnaire was devised to be dispatched to project coordinators to glean insights into their achievements and ICT utilization. Leveraging the initial database, a preliminary analysis of available project information was conducted. Subsequently, project coordinators who met the stipulated criteria were contacted to complete a questionnaire, facilitating the collection of more granular information on various investigation-relevant facets. The design of the questionnaire was carried out specifically for the research based on indicators from the Erasmus+ Program Guide and questionnaires from international studies such as ICILS [35], [36], PISA [37] and TALIS [38], [39]. A complete detail of the questionnaire design has been detailed in previous publications [9]–[12] and is fully reflected in the doctoral thesis.
3. **Interview Phase:** The third stage involved interviews with projects that exhibited sustained positive outcomes and with educational institutions, educators, or students involved. Informed by the questionnaire data, diverse analyses were undertaken. Projects that demonstrated enduring impacts post-funding phase and featured participation from educational institutions, teachers, and/or students were chosen for interviews. A semi-structured interview was carried out with a script to guide the questions and collect information of interest. These interviews aimed to extract additional insights into the success drivers of these projects.
4. **Focus Groups:** The concluding phase entailed focus groups involving the most remarkable projects that successfully navigated the preceding stages. The objective was to delve deeper into the success factors underpinning these standout projects. Through group discussions, participants exchanged ideas on what contributed to these projects' success, how ICT and e-learning were harnessed, and the anticipated future possibilities.

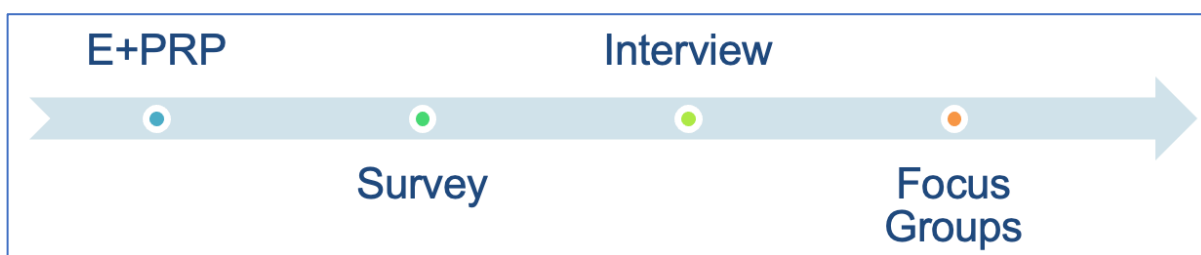


Figure 2: Phases for the research

The framework for project mapping and filtering adheres to the PRISMA model [40], [41], an adaptation of the literature review process tailored for research project reviews within this study.

The primary entities involved in the mapping, screening, and engagement throughout the various research phases were as follows:

- Initially, a total of 1,144 projects were associated with the terms “eLearning” or “e-Learning”, categorized as good practice and falling under key actions KA1 and KA2 (as initial criteria). Among these, 256 projects were devoid of any educational institution collaboration, and in 39 instances, avenues for contact could not be established.
- Following this, 849 project coordinators were contacted; 187 completed and submitted the survey.

- During the subsequent phase, 58 projects fulfilled the prerequisites for the interview stage. Ultimately, 22 of these projects consented to participate in the interview process.

3.2. Ethics

The entire information-gathering process adhered to prior participant consent, ensuring voluntariness, in line with the British Educational Research Association (BERA) [42] and the University of Salamanca Ethics Committee. No personal data was stored, and the focus remained on participants' viewpoints regarding their participation in the Erasmus+ program and the institutional-level insights they gleaned.

4. Results

The complete development of the results obtained exceeds the limits of this article. They have been reflected in different previous publications and in the doctoral thesis that will be available in the doctoral repository of the University of Salamanca [43], [44] and on the website developed as one of the thesis results <https://bit.ly/3Etz0T3>.

Therefore, this section reflects the most notable results concerning the main objectives that were set in the research:

- Know the success factors of projects classified as “good practice” that use eLearning and/or ICT.
- How they used ICT and/or eLearning and their impact on the teaching-learning process.
- Propose a methodological proposal based on the elements detected from the research.

4.1. Identified success factors

Derived from the cumulative insights gathered throughout all research phases, prominent success factors consistently echoed across the diverse research instruments employed. They were obtained through the different instruments used to collect the information (questionnaire, interview and focus groups) and by crossing the data of the perceptions collected from the project coordinators in the different stages.

These factors include effective collaboration between institutions, active engagement of key stakeholders who are the recipients of the educational activities, crafting projects around innovative themes pertinent to both institutions and participants, seamless integration of the project into the institutions' everyday teaching practices, and judicious utilization of digital resources.

Table 1 portrays the alignment of these success factors concerning the research questions that served as the initial foundation.

Table 1

Success factors detected in relation to the research questions posed

Research question	Success factors detected
PI1: What are the characteristics of the projects considered as good practice?	Cooperation among institutions Attention to real needs of students and teachers Innovative nature of the project theme
PI2: How do Erasmus+ projects labelled as good practice have an impact and remain active in educational institutions over time?	Implementation of the project in the institutions Good use of digital resources

4.2. Use of ICT in Erasmus+ projects

Notable insights about the utilization of ICT in educational projects have surfaced. The viewpoints of teachers, students, and the utility of project-generated resources during the pandemic have been observed.

Particularly noteworthy is the analysis of exceptional ICT tools and their pandemic-driven significance [45] in the realm of electronic learning (eLearning, ICT).

A pronounced augmentation in available digital didactic resources for the teaching and learning processes was evident among the examined projects.

These encompassed digital educational toolkits, interactive educational video games, robotics, digital methodological guides, and curricular designs integrating ICT.

In the use of ICT methodologies for professional teacher development within Erasmus+ projects related to eLearning [46], the following observations were made:

- The most prevalent ICT tools utilized by teachers encompass office automation management, essential skills, presentations, collaboration platforms, video, and photo editing, as well as digital learning environments.
- Regarding ICT devices, laptops and desktops emerged as the primary choices, with tablets and smartphones gaining prominence based on educational contexts.

In the sphere of ICT and students, predominant methodologies within the projects [47] are characterized by:

- Prominent ICT tools among students include office automation management, basic skills, network resource usage, collaboration platforms, and digital educational games.
- Common ICT devices encompass laptops and desktops, with smartphones and tablets prevalent depending on the sector.

Across all the analysed projects, ICT utilization appears largely complementary to project objectives, with advanced applications and functionalities only sparingly observed.

The applications predominantly reflect basic functionalities, transitioning traditional paper-based tasks to digital formats.

Exploring advanced aspects such as data analysis techniques, computational thinking, robotics, or artificial intelligence is generally absent.

This finding aligns with data from the International Computer and Information Literacy Study (ICILS), highlighting a superficial usage of applications by both educators and students [35], [36].

However, in the interviews and focus groups, all the coordinators claimed to have obtained improvements in the teaching-learning processes, both in academic results and motivation. Furthermore, in the projects that participated in these phases, the fact of having developed digital resources had helped training during the pandemic.

4.3. Methodological proposal

As previously highlighted, the study aims to devise a project design methodology that ensures success and meaningful impact for intended individuals and institutions.

The pivotal domains that have been identified as essential encompass (see Figure 3):

1. A thorough analysis of institutional needs to be addressed.
2. Initial assessment to ascertain the starting context.
3. Identification of compatible partners or stakeholders sharing common interests and needs.
4. The project's formulation outlines milestones, objectives, activities, and responsible parties.
5. Timely project development, with adaptability as necessary.
6. Comprehensive dissemination across all stages.
7. Ongoing evaluation to enable process adjustments during implementation.
8. Integration of projects into institutions' daily operations.
9. Concluding evaluation.

It is important to note that the detailed methodological proposal will be made available upon the thesis's publication, including a comprehensive results analysis. Here, only a sketch of the main ideas of the results obtained in a research work that has lasted four years is shown.

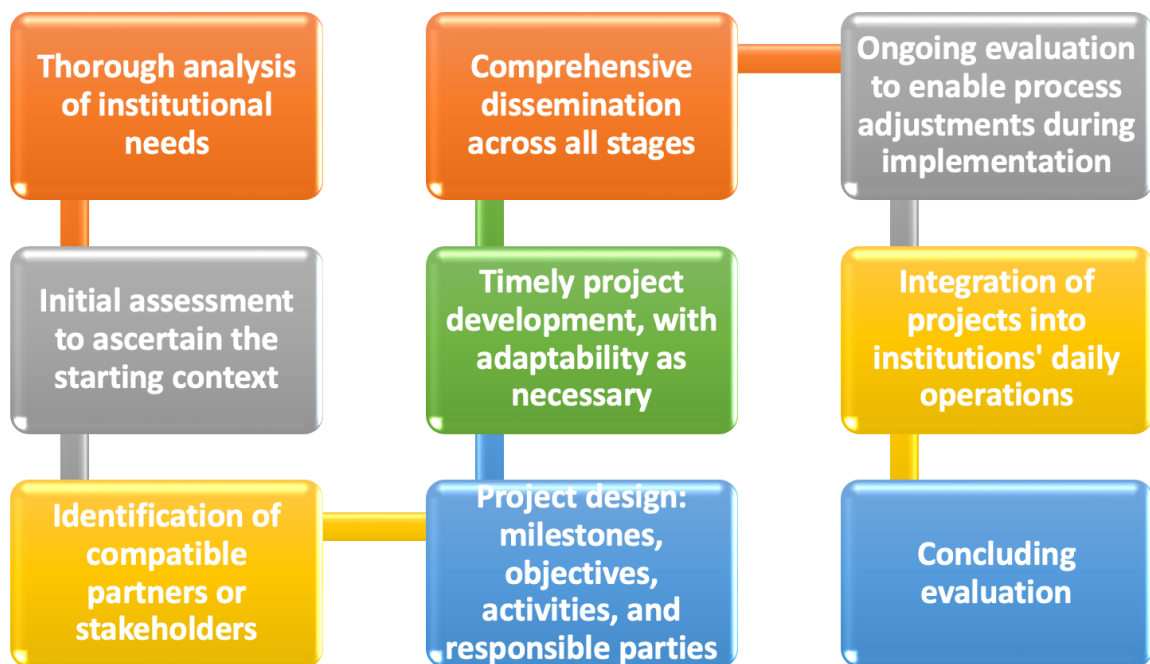


Figure 3: Phases for the methodological proposal

5. Discussion and conclusions

This article presents the outcomes of a research endeavour to extract pivotal success factors and insights from Erasmus+ projects categorized as exemplary practices and aligned with eLearning and/or ICT utilization. All scrutinized projects fall under the spectrum of interactive education facilitated by educational applications.

The core objective of this research is to unveil the employed methodology for analysis and offer illustrative instances of transformative projects. These projects have effectively influenced educational processes, successfully motivating students, apprentices, teachers, and trainers within the teaching-learning process.

Furnishing guidelines founded on successful educational ventures equips educators with tools to enhance instructional practices and explore fresh methodologies, inevitably fostering the implementation of projects with tangible impacts within institutions.

Key findings underpinning the triumph of projects that underwent all phases encompass:

- Innovative solutions designed to address genuine needs, proving their effectiveness.
- Products or outcomes are accessible to all users, enhancing their transferability and outreach to diverse educational institutions.
- Engagement of primary stakeholders (students, teachers, apprentices, trainers, businesses, associations, etc.) to validate the efficacy of materials and integrate them within institutions.
- Integration of materials into institutions' daily routines, contextual adaptation, ongoing updates, and sustainability.
- Efficient coordination and management among project partners, establishing links between consecutive projects.
- Creation of dissemination materials and provision of training activities to maximize outreach and awareness.

However, one cannot lose sight of certain limitations in the research carried out. In fact, throughout the research, certain limitations have been identified, including:

- Evolving European educational projects: The initial 2020 sample may not encompass subsequent projects, which could introduce new insights or reinforce existing findings.
- Impact of voluntary participation: The sample comprises projects whose coordinators participated voluntarily, potentially influencing results, though overall representativeness remains adequate.
- Sustainability of exemplary projects: Some projects deemed exemplary seem to remain active only during their funding period, prompting concerns about long-term sustainability.
- ICT and eLearning alignment: Despite using terms like "e-Learning," projects within the E+PRP database do not always directly align with eLearning methodologies; digital tools serve as complementary components in most cases.

Challenges encountered by projects involve the pursuit of ongoing updates amid the relentless advancement of technologies. Some educational projects developed with funding face constraints in maintaining updates following technological shifts.

An effective way to solve this handicap is creating institutional infrastructure by seamlessly integrating projects into educational practices and study curricula. This action plan remains an infallible approach to establishing sustainable initiatives, as highlighted earlier. Garnering support from administrations or collaborating institutions to maintain resource updates also proves beneficial. Furthermore, institutions can extend the impact achieved through these initiatives by forming networks among institutions to collaboratively develop successive projects aimed at refining or expanding related aspects or by pursuing new projects aligned with the same research trajectory.

These highlighted aspects have undeniably been instrumental in categorizing the projects discussed in this article as exemplary practices and sustaining their relevance to the present day. The culmination of this comprehensive analysis is the development of a doctoral thesis, introducing a methodological framework to guide the design and execution of successful projects. This framework will also be accessible through a dedicated website developed within the purview of this study.

In summation, by adopting these guidelines, alongside those uncovered during the examination of similar projects, educational institutions are not only equipped with available educational resources but are also inspired to craft new projects with a high likelihood of success.

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