PLATFORM SPECIFICATION AND DESIGN

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INTRODUCTION

The aim of the ALIEN (Active Learning in Engineering) project is to design, implement and validate an Active Learning context based on PBL (Project/Problem) methodologies addressing real-life issues related to science, technology, engineering and math (STEM) concepts. The methodology will be supported by a Virtual Learning Environment integrating a set of digital tools that will allow teacher and students to experiment, collaborate and communicate in an extended and multinational learning community that will also include other stakeholders like researchers and managers.

This document presents the specification and design of that platform. It was established through desk research to assess development possibilities and through collaborative work between consortium partners.

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DEVELOPMENT TOOLS AND RESOURCES

Two different development options were considered: (1) taking an existing open source online platform (VLE) and customize it for the ALIEN purposes or (2) develop it from scratch.

ADAPTABLE PLATFORMS

This option considers the use/adaptation of existing platforms for the purposes of the project.

(1) LEARNING MANAGEMENT SYSTEMS

E-learning platforms or Learning Management Systems - LMS) allow teachers to share information and to communicate with their students. These platforms are usually very static, too structured and do not have the necessary flexibility to allow for personalized learning without customization of the software. Nevertheless, there are some Open Source Learning Management Systems that can offer the dynamic and flexible features needed.

1. Moodle

Moodle is one of the most popular open source LMS options available today. It features dashboards, learner tracking, and multimedia support. It also allows to create mobile-friendly online courses and integrate third-party add-ons. One of the standouts of this tool is the user community and the online support database. Moodle code is open and fully customisable.

2. ATutor

This open source LMS has a variety of features, from email notifications to file storage. ATutor is also user-friendly and accessible. It also offers themes to speed up the eLearning course development process, as well as eLearning assessment tools, file backups, analytics, and poll integration.

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3. Eliademy

Eliademy is free for educators and eLearning facilitators, but a small fee per user is charged for the Premium version. It features eLearning course catalogs, eLearning assessment tools, and a mobile Android applications for educators who wish to develop mobile learning modules for their on-the-go audiences.

4. Forma LMS

Forma LMS includes different features like skill gap analysis and detailed analytics and reporting. It also boasts certificates, competency management support, and a wide range of virtual classroom management tools, including calendars and event managers. Forma LMS is suited for corporate training programs and offers an active online community where it is possible to find advice, tips, and tricks.

5. Dokeos

Dokeos features a variety of eLearning templates and eLearning course authoring tools to create rapid eLearning. Their website also features useful information, including video tutorials that walk through every step of the process. The interface is user-friendly and intuitive.

6. ILIAS

ILIAS is SCORM 1.2 and SCORM 2004 compliant. It's flexible, versatile, and scalable and a full-fledged collaborative eLearning platform, allowing to communicate with the team and to share documents all in one place. It's free of charge for all eLearning developers and organizations, as well as educational institutions, regardless of the number of users.

7. Opigno

Opigno is based on Drupal and includes certificates, class calendars, online forums, eLearning authoring tools, eLearning assessments, and video galleries. It is possible to manage a virtual training program, track learner skill development, and integrate e-

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commerce using just one tool. Opigno also offers online surveys, instant messaging, and chat, which makes it a great feedback and collaboration tool.

8. OpenOLAT

eLearning assessment tools, social learning integration, and learner home pages are just some of the things that set OpenOLAT apart from many of the other open source LMS solutions. There is also a class calendar, email notifications, eLearning course bookmarks, file storage, and certificates. OpenOLAT makes it simple and straightforward to add users and groups to an eLearning courses, as well as develop comprehensive eLearning course catalogs. Another notable highlight is its browser check features, which gives you the opportunity to test the eLearning course on a wide range of browsers to make sure it is compatible. This is ideal for multi-platform eLearning courses that need to run on a variety of different devices.

(2) PROJECT MANAGEMENT SOFTWARE

Project management software allows to manage tasks and resources in a project therefore organizing and structuring the whole process.

1. GanttProject

Founded in 2003, GanttProject is ideal for small businesses that need project planning, resource management, and task management capabilities but that also have an IT staff that can oversee implementation and troubleshoot issues.

GanttProject is written in Java (requires Java RunTime) and is compatible with Windows, OSX, and Linux operating systems.

Capabilities include task management, resource management, and project planning using Gantt charts and PERT charts. Users can export data to .csv and generate summary PDF reports.

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GanttProject product is fairly robust and it is quite clear what the product does and what it does not. In addition to FAQs, the vendor provides several support resources including video tutorials contributed by volunteers and a support forum.

Project tasks cannot be measured in hours, only days. While this isn't a con unique to GanttProject, it may deter teams that need to manage smaller projects where single tasks don't require a day or longer to complete.

2. OpenProject

OpenProject Community is a robust project management solution written in Ruby on Rails and compatible with Linux operating systems. Free capabilities in OpenProject Community include task management, time tracking, team collaboration, project planning using Gantt charts, budgeting, and reporting. It also supports Agile project management and offers task boards, backlogs, bug tracking, and roadmapping.

Users can upgrade to a paid license if they want to use OpenProject in the cloud or as an enterprise. Paid plans offer additional capabilities, including customization, security, and support. OpenProject includes the entirety of their project management capabilities in their free version. But the price for businesses that want to upgrade to OpenProject Cloud or Enterprise for customization options, security features such as two-factor authentication, and professional support is reasonable.

OpenProject Community offers minimal support outside of user guides. Additionally, as with any self-installed desktop solution, you either need to be tech savvy enough to troubleshoot issues on your own, or have an IT staff that can oversee installation and system maintenance for you. Windows OS is not supported, and to run OpenProject on OSX requires setting up a development environment. Linux may be the preferred OS for developers, but Windows is hands down more mainstream, which makes the fact that it isn't supported problematic.

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3. OrangeScrum

OrangeScrum is a task and project management tool, available as a free and open source downloadable desktop app called “OrangeScrum Community,” or for purchase as a cloud-based or self-hosted software. It is written in CakePHP and is compatible with Windows, OSX, and Linux operating systems.

Free, standard features include task management using lists or a Kanban board, resource utilization, and task and resource reports and analytics. Users can purchase premium features as add-ons to the free plan, or they can upgrade to a paid plan.

Premium features include time tracking, recurring tasks, Gantt charts, project templates, client management, and user role management. Training and onboarding support is available for an additional fee.

OrangeScrum Community users have access to a global forum as well as online documentation to help troubleshoot issues. There’s also an installation guide and email, Skype, and phone support. Capterra reviewers give the product an average 4/5 stars for customer service.

Users may find information surrounding OrangeScrum’s plans a little confusing, as the free and paid versions go by the same name. If you do a Google search for “OrangeScrum” the top results are for organgescrum.com and orangescrum.org, with no clear indication that they are the same product.

4. ProjectLibre

ProjectLibre is a popular open source project management tool with over three million downloads. It offers Gantt chart functionalities that help you create tasks and simultaneously visualize the critical path on a single dashboard and visualize task dependencies and spreadsheet reports for calculating project costs and understanding resource availability.

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The tool is compatible with Microsoft Project, allowing to migrate Gantt charts and files. ProjectLibre's user interface isn't inviting for those unfamiliar with Microsoft Project and similar tools.

ProjectLibre is compatible with OpenOffice, LibreOffice, and Microsoft Project 2003, 2007, and 2010, but it has not been updated to accommodate fully with Microsoft Project 2013 or 2016.

5. ProjeQtOr

ProjeQtOr is a solid, open source project management tool originally released in 2009 by French developer Pascal Bernard. Over the years, dozens of contributors have put significant work into the project, expanding it into a deep project management system with a dizzying number of features, including portfolio management, bug tracking, risk management, and budget management.

ProjeQtOr is completely free; the developer makes money off the project by charging for hosting the system, premium support (basic support is available via community forum), professional training, and developing custom features. Users can also request features for free in the forum; "sponsoring" a feature request just expedites the process. The system is regularly updated, with new patches coming out several times per month and a new major update to add features and address issues roughly every other month. The community forum is also very active. Bernard (who goes by "babynus" on the forum) responded to ten topics on the day we took a look at it.

ProjeQtOr has a lot going on which can be overwhelming for new users, and the website itself says: "ProjeQtOr can frighten you at first sight: The number of menu icons available after installing the application is impressive, and you may dread complexity.

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(3) Collaborative and Social Networking Platforms

In today's world, the social network is more than just a chatting platform, it is now a source of knowledge and awareness. Open source social network development platforms come with pre inbuilt tools those are flexible and helps to easily customize and build on top of it.

1. Elgg

The Elgg is an open source social network software which is free to download. It is built on a framework that allows creating any kind of social environment; whether to start a social network for school, colleges, or for an organization to build communities you can use the Elgg. It is a 2008 award-winning open source social networking engine. Elgg uses the Apache, PHP, MySQL and Linux environments and has a good community to solve the arising issues with a repository of 1000+ open source plugins.

Elgg features

- Well-documented core API for developers to easily start and learn
- Composer to make the installation of Elgg easy and simple, also maintain the Elgg core and plugins
- Flexible system of hooks to allow extension and modifications of application with help of plugins, custom themes
- Cacheable system for good performance, user authentication, built -in security system such as anti-CSRF validation, strict XSS filters, HMAC signatures
- Client-side API
- Content access policies
- File storage
- Notifications service
- RPC web services

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2. Dolphin social networking

Dolphin Pro is an open-source software for creating custom social networks and web communities. It is written in PHP and for database uses the MYSQL. This social networking website software platform is fully modular and offers multiple modules such as Ads, Payments, Photos, Polls, Profile Customizer, Profiler, Chat, Profiler, Desktop, Facebook Connect, Forums, Videos, Memberships, Messenger, Page Access Control, World Map, Events, Custom RSS, Chat, SMTP Mailer, Sounds and more… It also features social profiles, timelines, likes, shares, voting, friends, Chat+ (WebRTC multiuser audio/video chat) and comments.

3. Opensource social network

The OSSN is another best open source social network software with a bit Facebook-like interface and features such messaging, friend request panel and few other elements. It allows creating a full-featured social media network platform that allows groups, photos, files, messages and more. OSSN is multilanguage social network software. It is available in two versions basic and premium, furthermore user can download it as an installer (Linux) or virtual image.

The Open source social network features third Party integrations, Tools Themes, Games, Audio Video Call, Authentication (Google reCAPTCHA) and more.

4. Humhub

HumHub is a free and open source social network software kit and framework with a user-friendly interface just like Facebook. It is lightweight and features multiple tools to make communication and collaboration easy. Humhub offers the ability to customize it to built and create your own customized social network, social intranet or huge social enterprise application.

The HubHum is a flexible system and offers a modular design that can be extended using the third party tools to connect existing software or any other even written by you. The Humhub offers a self-hosted solution which gives full control over your social network,

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means your server, your data, and your rules. Community and enterprise edition options are available.

5. Oxwall

Oxwall is a free social network software cum content management system. It based on PHP and uses MYSQL as a database to deploy the social network environment development. It available in three editions Free, Starter solution ($249) and Advanced solution ($2999). In the free edition, you will get the Oxwall software, Access to developers forum, Access to third-party plugins, and Access to the documentation. Thier CMS is compatible with all type of websites and scalable too.

6. BuddyPress

BuddyPress is a product of the well-known content management system WordPress. It helps to create social media networking websites with WordPress. It is simple and tons of themes available online for it, those help you to easily customize the look and feel of your social network website. BuddyPress is based on PHP and can be customized easily if you have the coding knowledge. BuddyPress is completely free & open source social network development platform.

BuddyPress social content management system features Custom profile fields, personal profile, email notifications (Smart read/unread), allow your users to create micro-communities, plugins and extensions support, private messaging, friendship connections, a platform for discussions and much more.

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DEVELOPMENT TOOLS AND RESOURCES

Considering the possible development from scratch of the ALIEN platform, different tools would be required.

(1) PROGRAMMING LANGUAGES

Behind all the web development tools is a language. A programming language is a formal constructed language designed to communicate with a computer and create programs in which you can control the behavior.

- PHP: Popular general-purpose scripting language that is especially suited to web development.
- NodeJS: Event-driven I/O server-side JavaScript environment based on V8.
- Javascript: Programming language of HTML and the web.
- HTML5: Markup language, the latest version of HTML and XHTML.
- Python: Programming language that lets you work quickly and integrate systems more effectively.
- Ruby: A dynamic, open source programming language with a focus on simplicity and productivity.
- Scala: Scala is a pure-bred object-oriented language allowing a gradual, easy migration to a more functional style.
- CSS3: Latest version of cascading style sheets used in front-end development of sites and applications.
- SQL: Stands for structured query language used with relational databases.
- Golang: Open source programming language that makes it easy to build simple, reliable, and efficient software.
- Rust: Systems programming language that runs blazingly fast, prevents segfaults, and guarantees thread safety.
- Elixir: Dynamic, functional language designed for building scalable and maintainable applications.

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- TypeScript: Open source programming language that is a superset of JavaScript which compiles to plain JavaScript.

(2) JAVASCRIPT LIBRARIES

Javascript is one of the most popular programming languages on the web. A Javascript library is a library of pre-written Javascript which allows easier access throughout the development of a website or application.

- jQuery: A fast, small, and feature-rich JavaScript library.
- BackBoneJS: Give your JS app some backbone with models, views, collections, & events.
- D3.js: A JavaScript library for manipulating documents based on data.
- React: Facebook's Javascript library developed for building user interfaces.
- jQuery UI: A curated set of user interface interactions, effects, widgets, and themes.
- jQuery Mobile: HTML5-based user interface system designed to make responsive web sites.
- Underscore.js: Functional programming helpers without extending any built-in objects.
- Moment.js: Parse, validate, manipulate, and display dates in JavaScript.
- Lodash: A modern utility library delivering modularity, performance, & extras.
- Vue.js – An open source JavaScript framework used for building user interfaces.

(3) FRONT-END FRAMEWORKS

Front-end frameworks usually consist of a package that is made up of other files and folders, such as HTML, CSS, JavasScript, etc. There are also many stand-alone frameworks out there. A solid framework can be an essential tool for front-end developers.

- Bootstrap: HTML, CSS, and JS framework for developing responsive, mobile first projects on the web.

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- Foundation: Family of responsive front-end frameworks that make it easy to design beautiful responsive websites, apps and emails that look amazing on any device.
- Semantic UI: Development framework that helps create beautiful, responsive layouts using human-friendly HTML.
- uikit: A lightweight and modular front-end framework for developing fast and powerful web interfaces.

(4) WEB APPLICATION FRAMEWORKS

A web application framework is a software framework designed to aid and alleviate some of the headache involved in the development of web applications and services.

- Ruby: Ruby on Rails is a web-application framework that includes everything needed to create database-backed web applications, with the MVC pattern.
- AngularJS: Lets you extend HTML vocabulary for your web application. AngularJS is a framework, even though it's much more lightweight and sometimes referred to as a library.
- Ember.js: A framework for creating ambitious web applications.
- Express: Fast and minimalist web framework for Node.js.
- Meteor: Full-stack JavaScript app platform that assembles all the pieces you need to build modern web and mobile apps, with a single JavaScript codebase.
- Django: High-level Python Web framework that encourages rapid development and clean, pragmatic design.
- ASP.net: Free, fully supported Web application framework that helps you create standards-based Web solutions.
- Laravel: A free, open-source PHP web application framework to build web applications on MVC pattern.
- Zend Framework 2: An open source framework for developing web applications and services using PHP.
- Phalcon: A full-stack PHP framework delivered as a C-extension.
- Symfony: A set of reusable PHP components and a web application framework.

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- CakePHP: A popular PHP framework that makes building web applications simpler, faster and require less code.
- Flask: A microframework for Python based on Werkzeug and Jinja 2.
- CodeIgniter: Powerful and lightweight PHP framework built for developers who need a simple and elegant toolkit to create full-featured web applications.

(5) TASK RUNNERS / PACKAGE MANAGERS

Tasks runners are all about automating your workflow. For example, you can create a task and automate the minification of JavaScript. Then build and combine tasks to speed up development time. Package managers keep track of all the packages you use and make sure they are up to date and the specific version that you need.

- Grunt: JavaScript task runner all about automation.
- Gulp: Keeps things simple and makes complex tasks manageable, while automating and enhancing your workflow.
- npm: Pack manager for JavaScript.
- Bower: A web package manager. Manage components that contain HTML, CSS, JavaScript, fonts or even image files.
- Webpack: A module bundler for modern JavaScript applications.

(6) DATABASES

A database is a collection of information that is stored so that it can be retrieved, managed and updated.

- MySQL: One of the world's most popular open source databases.
- MariaDB: Made by the original developers of MySQL. MariaDB is also becoming very popular as an open source database server.
- MongoDB: Next-generation database that lets you create applications never before possible.
- Redis: An open source, in-memory data structure store, used as a database, cache and message broker.

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- PostgreSQL: A powerful, open source object-relational database system.

(7) API TOOLS

Web developers typically deal with APIs on a daily basis. They are essential in today's web development environment, however, can sometimes be difficult to deal with in terms of monitoring, creating, or combining. Thankfully, there are a variety of tools available to make working with APIs much more efficient.

- Runscope: An API performance testing, monitoring, and debugging solution.
- Zapier: Connect the APIs of various apps and services in order to automate workflows and enable automation.
- Postman: Complete API development environment. Everything from designing, testing, monitoring, and publishing.
- SoapUI: Advanced REST and SOAP testing tool. Ability to perform functional testing, security testing, performance testing, etc.

(8) COLLABORATION TOOLS

Every great development team needs a way to stay in touch, collaborate, and be productive. A lot of teams work remotely now. The team at KeyCDN is actually spread across many different continents. Tools like these below can help employees streamline their development workflow.

- Slack: Messaging app for teams that is on a mission to make your working life simpler, more pleasant, and more productive. One of our favorites, we use this at KeyCDN!
- Trello: Flexible and visual way to organize anything with anyone. We also use this as KeyCDN.
- Glip: Real-time messaging with integrated task management, video conferencing, shared calendars and more.
- Asana: Team collaboration tool for teams to track their work and results.

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- Jira: Built for every member of your software team to plan, track, and release great software or web applications.

(9) WEBSITE SPEED TEST TOOLS

The speed of a website can be a critical factor to its success. Faster loading websites can benefit from higher SEO rankings, higher conversion rates, lower bounce rates, and a better overall user experience and engagement. It is important to take advantage of the many free tools available for testing website speed.

- Website Speed Test: A page speed test developed by KeyCDN that includes a waterfall breakdown and the website preview.
- Google PageSpeed Insights: PageSpeed Insights analyzes the content of a web page, then generates suggestions to make that page faster.
- Google Chrome DevTools: Set of web authoring and debugging tools built into Google Chrome.
- Dotcom-Tools Speed Test: Test the speed of your website in real browsers from 25 locations worldwide.
- WebPageTest: Run a free website speed test from multiple locations around the globe using real browsers (IE and Chrome) and at real consumer connection speeds.
- Pingdom: Test the load time of that page, analyze it and find bottlenecks.
- GTmetrix: Gives you insight on how well your site loads and provides actionable recommendations on how to optimize it.

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SPECIFICATION AND DESIGN

Agile learning methodologies will be used for the development of the platform and tools. In agile processes the design phase is revisited over and over in cycles during the implementation of a product or service to ensure that outcomes meet the needs of the target users through the integration of user input throughout the design and implementation process. In educational contexts, agile practices can be applied by encouraging learners to revisit their initial solutions to a given problem once more feedback on how their solution addresses user needs is generated through evaluation or other means. In other words, learners are encouraged to apply agile practices in the context of their educational projects.

To specify requirements and to design the platform, user stories were created and compiled in the form of a Product Backlog.

PRODUCT BACKLOG

The agile product backlog is a prioritized features list, containing short descriptions of all functionality desired in the platform. Typically, the scrum team and the product owner write down everything they can think of for agile backlog prioritization. This agile product backlog is almost always more than enough for a first sprint. The scrum product backlog can grow and change as more is learned about the product.

The predominant way to express features on the agile product backlog is in the form of user stories, which are short, simple descriptions of the desired functionality told from perspective of the user. In this case, three different user roles were selected: students, teachers and school managers. The user stories were created by the consortium members following their teaching experience.

Technical work and knowledge acquisition activities also belong on the agile backlog. An example of knowledge acquisition could be a backlog item about researching various JavaScript libraries and making a selection. For ADLES, the technical work entries will be decided by the development team.

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The prioritization of the agile product backlog will be decided by the development team in a later stage. As such, the following list of user stories is not prioritized.

(1) GENERAL REQUIREMENTS

- Should support the community and the features should be used by everybody, should be user-friendly with a great emphasis on the spirit of community and collaboration;
- Should allow users to access content related to the domains chosen. That said, can`t be too generic;
- The target group of the community should be clear: teachers or students (or both) and what type of engineers (from all Engineering fields or just from a specific one);
- Each domain, depending on the target, should have a specific platform (starting from a generic data base);
- Work as a meeting point that provides solutions to the community;
- Include different strategies of active learning with different activities and adapt the community with that in mind (have an option to select which one);
- The platform should reflect the different stages of PBL and manage the learning process;
- Include team work support and extra functions, including communication systems and sharing of information, debates, discussion groups and video reactions.
- Should also include evaluation, applying digital systems (composed of multiple questions with the same level of difficulty):
    - Constant monitoring of results;
    - Also, a test to evaluate the learning experience and understand how the students see the experience, providing a more active evaluation and including peer review. Additional, the evaluation should include the reflection of students, written in a report.

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Additionally, the platform should permit:

- Organization of teams to report problems.
- Students can produce evaluation content and problem creation for sharing purposes;
- Should have a list of types of PBL and find software that could help students — a template with multiple interfaces;
- Problems related to software development;
- Applying the same strategy with members from different areas and promote reflection — including the premise of “learning by failure”;
- Multidisciplinary approach and focus on problem solving;
- Explore the strategy of collective storytelling;
- Inclusion of automatic complier to decide if the solution in case is correct or not. That would facilitate evaluation;
- Translation system in the back end and platform translation into English. Other languages could potentiate more users.

In terms of difficulties, it is advisable to be aware that:

- The platform can´t be too difficult to use — it should be user-friendly;
- Having to create external platforms to accommodate the community (depending on the institution);
- Teacher training (if teachers have training in this area or are from a specific Engineering field, they might be able to do it alone, but if they don’t, it can be hard for them and training should be provided);
- Should facilitate the transition for teachers (apply some similarities of other existent systems);
- There are different time zones when students are playing and therefore it becomes necessary to handle this issue when students are playing in teams from all over the world;

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(2) Student User Stories

As a student using the ALIEN platform, I want to:

1. Get feedback on assignments to I can learn
2. Compare myself with others so I can see if I am best
3. Be able to upload material such as video, photos and text files to present results of the group work
4. Learn how to work in groups to improve my group work skills
5. Be able to contact my group members and share the material produced with them so we do not have to do individual assignments
6. Learn by use of games because it makes me more motivated
7. See videos of things I do not understand because it helps my perception of what I have to do
8. Be able to print (either on paper or electronically) what we have done to bring to my home to work more on it or to show my parents
9. Have direct contact to the teacher for support when we are stuck to prevent waiting time and to present that others in class see that we have a problem
10. Want to be able to see another group's work (when finalized) so I can learn from that as well
11. Learn through a combination between the platform and physical presence and use of my hands so I also learn how to become better at physical things I am training for
12. Be able to see simulations of how I perform when meeting customers that I train to meet through my vocational education to be better at doing that
13. See pictures or similar of the problem we have to work on because I have a better perception of pictures than text
14. Use my creativity to build assignments for other groups in class because I could learn from that
15. Be able to save what we have done so we don't waste everything when the clock rings (or the computer is out of electricity without us realizing that)
16. Be able to retrieve saved material so we do not miss anything

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17. Be able to search for different assignments or games that can fit to the challenge we have in the group to support the challenging parts of PBL (such as problem formulation, team work that is not going well, getting in groups with persons I do not normally talk to)
18. Be able to personalize (set name, color etc.) how the group is represented on the platform because it makes me and the group more unique and adds to the feeling of being one group
19. See how well I (or me and my group) do on the assignment so I can understand what the teacher thinks of the way we work
20. Be able to distribute parts of the work to other persons in the group so we individually can write something/upload photos or videos etc. to make the group work more effective
21. Be able to select fonts, colors on fonts, sizes and others as part of the writing on the platform to accommodate my thinking of any text-based system
22. Be able to communicate with other groups because we know they may know something we do not know
23. Use emojis or similar when communicating with other groups because I am used to do that when communicating with my friends outside school (on mobiles)
24. Be able to link to websites which have information on the work we do in the group to make sharing and documentation easy
25. Be able to use the cursor when selecting elements (click and drop) on the platform since that I am used to that
26. Have the possibility to increase the front sizes so we can read all of us in the group to prevent that some in the group cannot see what it says
27. Work on real problems that someone owns since that makes me more motivated
28. When learning physics, I want to use physical lab simulators, e.g. atomic physics by experimenting with atom models, where I can manipulate collisions of different atoms in a simulated atom accelerators, Fission-bombs, Fusion-Bombs and simulated nuclear reactors but also with physical simulator where I can experiment with the effect of the special Relativity theory and the general Relativity theory

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29. When learning chemistry I want to use a chemistry lab simulator, where I can mix different liquids to see the chemical formula reaction schemes and physical effects e.g. color, explosions etc. and look at the molecule models new compositions
30. When learning Physics I want to do simulated magnetics experiments to experiment with current, coils, Forces, Velocity, Flux, and geometrical dimensions, by controlling parameters and measure the resulting effects e.g. in a Tesla car
31. When learning Biology, I want to do simulated Bio Chemical experiments e.g. on simulated animals to see how medicine affects their behavior and well-being or with simulated DNA experiments to speed up the long time it takes to finalize the process
32. When learning Health Science, I want to do simulated human surgery operations by means of the real tools and 3D glasses in an augmented setup, in a simulated process to perform e.g. heart operations where my performance is monitored and scored.
33. I want to learn a language by using a virtual language teacher (chosen by me from several artificial female and male teacher candidates), which I like and which adapts to my level and learning style and learn me to optimize my accent, vocabulary and read/write velocity.
34. Move around like in Minecraft and find a problem to solve and then solve it and then go back to shooting one another. Each time we solved a problem we would get more points so we could buy more things in Minecraft
35. Keep track of where I am up to. I often find it hard to remember here I am up to because I have autism and that means I struggle with complex things. Maybe it would have an indicator.
36. Know how much time I have left so it would be nice to have a clock.
37. Be able, at the end of the session, to review what I have done and maybe see how I got to the end – maybe I could add comments to stages – I think that might help me learn how to solve problems
38. Be able to think about a problem and do some solving over the week and then maybe upload all the bits and pieces – the evidences if you will – to the portal later and then describe how I did it.
39. Award myself points for the most profitable avenues I have gone down as a retrospective.

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40. Have things on paper – it would be neat to have a collage of my work at the end
41. Work together with my best friends.
42. It to be like google docs so we could both type into something at the same time. Or do different stuff according to our preferences
43. Be able to use the portal as I am partially sighted so I need big text
44. Be able to control what the teacher can see at any moment. I don't want her/him to see the early drafts so I'm just going to do all my stuff in word and then stick it into the portal at the end
45. It to be really easy to use without lots of instructions and I want it to do spell checking.
46. Allow me to problem solve with my friend back home – if we could maybe do something online with the portal. If not – it would still be nice to be able to whats app him with what I have been doing.
47. Be easy to use and I want it to be easy to minimise so I can get on Minecraft in between doing the work. Me and my friends are working on one project so it would be good if we could all see what each other is doing even on our own laptops or even on a shared laptop – but actually – I might like to hide some of what I'm doing from the others because Theresa can't be trusted sometimes and she might just copy off me and then the teacher might think I copied off her
48. Allow me to see how the other groups are doing – that way I might be able to persuade Boris (he's the lazy one) to do some more work
49. Be able to shoot in and out of Google so it would be good if we could drop links into the platform and maybe images from google or even Youtube videos
50. Allow kids with special needs to have extra hints and tips – maybe we could sort of send them some hints and get extra points for our team. In fact it would be neat if we could be awarded points by the teacher (Brownie points) for keeping our effort moving…
51. Be able to use my phone to photograph stuff – I hope it's easy enough to get pictures from my phone to the portal or else I probably wont bother sending them up. In fact – the only reason I might use the portal is to get Brownie points so I suppose it has

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to do something 'magical' with everything we have done – like that old Facebook Intel thing my mum once had

52. Be able, when we're done, to package the magic and send it back to all of us in the group

(3) Teacher User Stories

As a teacher using the ALIEN platform, I want to:

1. See the Project-Based Learning (PBL) plan so that I can decide if I would like to use it or not with my students
2. Know the requirements of a PBL plan so that I can decide if I can do it in my school
3. Assign students to a PBL plan so that I can introduce them in what they have to do
4. See the contributions made by student to a PBL so that I can track what they have done and if they have any problem
5. Edit a PBL plan so that I can include new information or make changes to adapt it.
6. Give indications to students (chat) so that I can support them
7. Be able to ask questions/query to students so that I can check their developments
8. Be able to remove/censor non-appropriate student contributions so that I can control the working spaces
9. Be able to propose a work plan to students so that I can guide them during the project development
10. Be able to survey students in order to know what are their interests and difficulties
11. Share student their products among different teams so that they can do peer assessment or presentations
12. Survey my students about their interests so that I can perform group formation and PBL assignment
13. Ask questions to individual team members so that I can assess the team work
14. Be able to create/edit PBL plans so I can develop my own projects
15. Be able to search for partners interested in some PBL plan so that I can collaborate with other schools

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16. Be able to report issues to the administrator so that I can be supported in case of administrative problems
17. Be able to make questions to an expert so that I can be supported in case of difficulties while developing the PBL
18. Be able to schedule a PBL plan so that I can manage the time appropriately
19. Make the sure the platform can help in sharing the homeworks with the classmates and in the communication with the teacher even from home
20. Make the sure the platform can help in keeping the lesson more active allowing the student to directly participate on the lesson he is listening through the platform. This can naturally happen if the class is rightly structured. Every l student will have his own IPad, there will be a monitor too with an Apple TV in every class and this will allow the lesson to be interactive.
21. Make sure the platform can help in developing working group. Thanks to this platform the teacher will overview the students work in order to guide them during the lesson, allowing the group to be more ordered and productive
22. Make the sure the platform can help in involving the students with apprentice problems or other problems through the drawing of personalized lessons
23. Give homework and evaluate them online so that we do not loose time at school.
24. Create groups and assign problems so that we practice subjects learned at school
25. Make sure it will be a safe discussion area so that students interact with each other and me, and also with students of other schools abroad which will also improve their language
26. Make sure that the online portal will make students more interested in the lessons as they are more used to online tools
27. Make sure the portal will allow to find teaching resources.

(4) Manager User Stories

As a manager using the PBL platform, I want to:

1. Know what are doing the teachers in their classrooms so that I have info to manage better

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2. Know what are doing the students in their classrooms
3. Know which methodologies are using my teachers in their classrooms so that I can evaluate their application.
4. Know which tools are using the students in their classroom-computers so that I can evaluate the convenience of them.
5. Know which tools are using the teachers in their classroom-computers so that I can evaluate the convenience of them.
6. Know what are the ratio learning/methodology in each methodology so that I can analyse its utility.
7. Know why the teachers have chosen the corresponding methodologies for their subjects/courses.
8. Know the best tools for implement the PBL so I can info for a better tool selection
9. Know the best if the PBL methodology is appropriated for the courses of my schools so that I can the most appropriate for each course.
10. Know which tools the students are using to learn outside the school so that I can evaluate its convenience.
11. Know the participation of students/teachers in activities under PBL methodology so that I can evaluate better its use.
12. Know the repositories where are stored the PBL activities linked with the corresponding subjects so that I can recommend to the teachers.
13. Know the repositories where are stored the PBL lesson plans linked with the corresponding subjects so that I can recommend to the teachers.
14. Know the repositories where are stored the PBL best practices linked with the corresponding subjects so that I can recommend to the teachers.
15. Know the repositories where are stored proposed Problems and Projects to be developed as PBL.
16. Control the access from users
17. Get statistics of the number of requests
18. Get statistics of the number of users
19. Get statistics of the evolution of requests per period
20. Be informed about malicious intent

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21. Be informed about computer junk
22. Search for profiles based on a few fields (class attended, location, name) so I can find others I might want to connect with.
23. Send an email to any member via a form so that we can connect
24. Read practicing and training activities and approve or reject them so that only applicants who qualify can become certificated
25. Edit any site member profile so that I can correct problems for members
26. Update the existing activities so that it reflects accurate information
27. Approve each information wanted before it gets to the platform so that we're sure of the quality of the information being listed.
28. Be emailed whenever a information is submitted so that I am aware of it and can decide if I want to post it.
29. Edit and delete information ads so I can correct small problems or make sure each ad complies with platform guidelines.
30. Make sure that information/activities published on the platform disappear 30 days after being posted
31. Run any report from a student or teacher can run so that I can see overall information for any activities on the site.
32. Have a free product so that I don't compromise my budget
33. Have a product that adapts to my existing infrastructure so that I don't need to invest and hence don't compromise my budget
34. Have an easy to use product so that I don't overburden my teachers' working time and hence don't compromise my budget
35. Have a very safe product so that I don't have any security issue with the general public, especially the parents
36. Get an innovative product so that I can publicize the school as innovative to the parents
37. Get an innovative product so that I can publicize the school as innovative to the educational authorities
38. Get a product that adapts exactly to the state official curriculum so that I can justify using it easily to the educational authorities

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39. Get a product that can open venues of collaboration with other educational institution which can last beyond the project's time frame
40. See how teachers interact with students so I can evaluate teacher performance.
41. Have a communication chance with teachers and students to take their feedbacks and expectations about the school and applications.
42. Carry out common exams in the school with the portal to evaluate differences between learning levels of classes momentarily and make an analysis.
43. Save time and place by making teachers use online tools everywhere.

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