Report WP2-A2

Specification of technical, content, and pedagogical requirements and limitations for The Evolving Textbook

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Result: Specification of technical, content, and pedagogical requirements and limitations for The Evolving Textbook

Related to: WP2-A2: Definition of platform requirements and limitations

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1. Introduction

This report presents the benefits and drawbacks of the analysed tools and applications described in alignment with the results of WP2-A1. Then, the selection of tools for the TET platform development is proposed. This is a comprehensive overview of the analysed software and a selection of the tools may be implemented in the TET platform. Furthermore, the deliverable will be very helpful to teaching and technical staff at partners' institutions who are interested in starting using digital tools and methods in their pedagogical activities.

An "evolving textbook" or a "living textbook" is a term that is often used to describe a new kind of digital textbook that is continually updated and improved upon. Traditional textbooks, once printed, are static and cannot be updated until a new edition is published. On the other hand, evolving textbooks can be updated in real-time as new information or research becomes available, errors are corrected, or educational strategies change (see: https://www.itc.nl/news/2021/1/937635/the-living-textbook-learning-concepts-as-the-brain-wants-to-see-them; https://www.itc.nl/facillities/living-textbook/).

Evolving textbooks may use multimedia and interactive elements such as video, audio, interactive quizzes, and even virtual reality experiences to engage students in a deeper and more active learning process. They may also include collaborative features that allow students and teachers to interact directly with the text and with each other, similar to social media platforms.

2. Definitions and abbreviations

Simulation – The process of modelling, performed on a computer, which is designed to predict the behaviour of a real-world or physical system.

Virtual Reality – an experience in which a person is surrounded by a three dimensional computer-generated virtual world, and is able to move around and do various actions.

3. Work methodology

The methodology consists of the following steps:

- Step 1 – Identification of most useful functionalities. Based on the survey results presented in Report WP2-A3 we have identified the functionalities which were indicated as useful by at least 20% of respondent, it was min 23 teachers (out of 116) and 45 students (out of 229).
- Step 2 – Identification of the most used e-learning platforms and tools. Based on the survey results presented in Report WP2-A3 we have identified the e-learning platforms and tools which were indicated as useful by at least 20% of respondent, it was min 23 teachers (out of 116) and 45 students (out of 229). For each e-learning platform and tool a short description was prepared.
- Step 3 – Identification of functionalities included into the e-learning platforms and tools. It was done for the most indicated e-platforms and tools. To indicate which functionalities are included in the e-learning platforms and tools we have used Chat GPT-4. Then, experts assessed the veracity of the information provided and made appropriate corrections.
- Step 4 – Identification of the main benefits and drawbacks of the e-learning platforms and tools. It was done for the most indicated e-platforms and tools.
- Step 5 – Identification of tools that can be used for teamwork and materials co-creation. In this step we have listed a selection of tools and we have presented links to the website where this tools are available. We were targeting tools available free of charge.
- Step 6 – Identification of tools that can be used to create tests, quizzes, or questionnaires. In this step we have listed a selection of tools and we have presented links to the website where this tools are available. We were targeting tools available free of charge.
- Step 7 – Identification of tools that can be used to create online video content. In this step we have listed a selection of tools and we have presented links to the website where this tools are available. We were targeting tools available free of charge.

- Step 8 – Identification of tools that can be used for brainstorming. In this step we have listed a selection of tools and we have presented links to the website where this tools are available. We were targeting tools available free of charge.
- Step 9 – Proposal of the rules of textbook online collaborative creation by a team. We have propose the rules to follow while creating an evolving textbook. These rules were important to identify the requirements and limitations for the platform.
- Step 10 – Using the available tools to create a textbook. In this step we have presented how different tools can be used to create collaboratively a textbook.
- Step 11 – Proposal of specification of technical, content, and pedagogical requirements. We have indicated what we recommend to be included into the platform to enable effective co-creation of an evolving textbook.
- Step 12 – Identification of limitations. We have indicated the most important limitations that should be taken into consideration in the platform development.

4. Identification of the most useful e-learning platforms and tools

4.1. Useful functionalities

The most useful functionalities were identified and they are:

E-mail notifications: These are alerts sent to a user's email address to notify them of specific events or updates within the e-learning platform. They can include things like new assignment notifications, discussion responses, grade updates, etc.

Teamwork: This is a set of collaborative functionalities that allows users to work together on projects, assignments, or discussions. It often includes file sharing, synchronous or asynchronous editing, and communication tools.

Can reuse PPTs, PDFs, Videos: This refers to the ability to upload and use previously created content, such as PowerPoint presentations, PDF files, or video files. This allows educators to use existing resources and materials in their courses.

Add new user: This functionality allows administrators or educators to add new users (like students or co-teachers) to the platform or a specific course.

LIVE chat: This feature allows for real-time text communication between users. It can be used for instant messaging, real-time discussion, or live support.

Test/Quiz: This is a feature that allows educators to create and manage tests or quizzes. It often includes features for question banks, automatic grading, time limits, and more.

Attendance/activity tracking: These features allow educators or administrators to monitor users' activity within the platform, such as their participation in activities, completion of tasks, or attendance in virtual meetings or lessons.

Self-registration: This functionality allows users to sign up for courses or the platform themselves, rather than needing an administrator to add them.

Email notification settings: These settings allow users to customize the email notifications they receive, such as which events trigger a notification and how often they receive these notifications.

Browse list of users: This feature provides a list or directory of users within the platform or a specific course. It may provide information like their role, contact information, or activity.

Drag & Drop interaction: This is a user-friendly feature where users can move and arrange items on the screen by clicking on them and then dragging and dropping them to the desired location. It is often used in interactive activities or for organizing content.

Lessons: This feature allows for the creation and management of lessons within a course. This can include content delivery, interactive activities, assessments, and more.

Discussion forums: These are online spaces for users to have asynchronous discussions, often organized around specific topics or activities. Users can typically post threads and reply to others' posts.

Voting: This is a feature that allows users to vote on options or items, such as poll responses, decision options, or the quality of responses in a discussion.

Commenting and feedback: These features allow users to leave comments on content or provide feedback to other users. This can be used for peer-review activities, feedback on assignments, or discussion participation.

Visual Classroom: This refers to an online space where learning content is shared visually, often in real-time. It can include features like whiteboards, screen sharing, video, and more.

Gradebook: A gradebook is a tool for recording the marks or grades students receive on assignments, tests, and other assessed activities. It allows for both instructors and students to track academic progress throughout a course.

User login page: This is the initial screen where users enter their credentials (like a username and password) to access the platform.

Social media: In the context of e-learning, this refers to the integration of social media platforms (like Facebook, Twitter, etc.) to share updates, facilitate discussion, or create a learning community.

Questionnaires: This is a tool for creating and distributing surveys or forms to gather data from users. This can be used for course evaluations, learning assessments, or data collection for lessons.

Grade comments: This is a feature that allows instructors to leave comments or feedback alongside grades in the gradebook. This helps provide context to the grade and guidance for improvement.

Course backup: This feature allows for course content and data to be saved and restored. It can be important for preventing data loss and allowing courses to be replicated or moved.

Alerts/notifications: Similar to email notifications, these are messages that alert users of specific events or updates within the platform. These notifications can often be customized and might appear within the platform, in addition to or instead of being sent via email.

Wikis: A wiki is a collaborative tool that allows users to create and edit web pages. In e-learning, wikis can be used for collaborative projects, resource sharing, or course content delivery.

Interactive presentations: These are slide shows or presentations that include interactive elements, like quizzes, polls, or embedded videos, to engage users and create a more dynamic learning experience.

Forum: An online forum is a discussion area on a website where users can post messages and respond to each other. They are typically organized into threads around specific topics.

Tests engine: A tests engine is a tool for creating, distributing, and grading tests. It can include features for different question types, automatic grading, randomization, and more.

Asynchronous Self-paced: This refers to a mode of learning where learners engage with the course material at their own pace and on their own schedule, rather than at set times determined by the instructor.

Role assignment: This feature allows for different roles (like student, teacher, or administrator) to be assigned to users. These roles often come with different permissions or access within the platform.

Audio recording: This functionality allows users to record audio directly within the platform. This can be used for things like oral assessments, feedback, or content delivery.

Assignment engine: This is a tool for creating, distributing, and grading assignments. It can include features for different assignment types, due dates, submission methods, and more.

Create online video content: This feature allows users to create and edit video content within the platform. This can be used for things like lecture delivery, demonstrations, or student projects.

Survey engine: Similar to a questionnaire tool, a survey engine allows for the creation, distribution, and analysis of surveys. This can be used for course evaluations, data collection, or interactive activities.

Task Assignment: This functionality allows instructors or team leaders to assign tasks to students or team members. This can be used for assignments, projects, or to-do lists.

Upload course: This feature allows instructors to upload a pre-created course or course content onto the platform. This can include things like syllabi, lesson content, assessments, etc.

Asynchronous instructor-led: This refers to a mode of learning where the instructor determines the pace and order of the course, but students engage with the material on their own time. This often involves pre-recorded lectures, set due dates, and discussion boards.

Synchronous Virtual Classroom: This is a digital learning environment where students and teachers interact in real-time, similar to a traditional classroom. This often involves live video conferencing, real-time discussion, and live presentations or demonstrations.

Programming/coding tools: These are tools or features specifically designed for teaching or learning computer programming. They can include things like code editors, compilers, or interactive coding exercises.

Peer review: This is a feature that allows students to review and provide feedback on each other's work. This can be used for formative assessment, collaborative learning, or to facilitate critical thinking.

Video conferencing integration: This feature allows for live video calls or meetings within the platform. This can be used for synchronous learning activities, office hours, group projects, etc.

Leaderboards: These are displays that rank users based on certain criteria, such as points earned or tasks completed. They can be used to promote competition and motivation.

Levels: In gamified learning platforms, levels can be used to mark a student's progress or achievement within the course. Students might level up by earning points, completing tasks, or mastering certain skills.

Points: Points are often used in gamified learning platforms as a form of scoring. Students can earn points by completing tasks, participating in activities, performing well on assessments, etc.

Rewards: In a gamified system, rewards are given to students when they achieve certain milestones, such as completing a difficult task or earning a certain number of points. Rewards can be things like badges, extra privileges, or new levels.

Blended learning: This refers to a mode of learning that combines online and face-to-face instruction. A platform that supports blended learning might have features for both synchronous and asynchronous activities, as well as tools for managing in-person activities.

Brainstorming: Brainstorming functionalities could include collaborative whiteboards, mind mapping tools, or shared note-taking features. These tools can be used to facilitate idea generation, project planning, or group discussions.

In the **Table 1** it is presented how many percent of teachers and students (see the report WP2-A3) indicated that these functionalities are useful.

Table 1 - The most useful functionalities of online platforms

Functionalities	**Demand from teachers**	**Demand from students**
E-mail notifications	57%	69%
Teamwork	51%	56%
Can reuse PPTs, PDFs, Videos	50%	59%

Functionalities	Demand from teachers	Demand from students
Add new user	49%	<20%
LIVE chat	48%	46%
Test / Quiz	45%	53%
Attendance / activity tracking	44%	<20%
Self-registration	41%	<20%
Email notification settings	41%	<20%
Browse list of users	37%	<20%
Drag & Drop interaction	36%	22%
Lessons	36%	59%
Discussion forums	36%	43%
Voting	36%	30%
Commenting and feedback	34%	42%
Visual Classroom	33%	32%
Gradebook	32%	<20%
User login page	31%	<20%
Social media	30%	41%
Questionnaires	29%	34%
Grade comments	28%	<20%
Course backup	28%	32%
Alerts / notifications	28%	<20%
Wikis	25%	30%
Interactive presentations	25%	23%
Forum	25%	22%
Tests engine	24%	<20%
Asynchronous Self-paced	24%	32%
Role assignment	23%	<20%
Audio recording	23%	28%
Assignment engine	22%	25%
Create online video content	22%	<20%
Survey engine	22%	<20%
Task Assignment	22%	35%
Upload course	21%	20%
Asynchronous instructor-led	21%	<20%
Synchronous Virtual Classroom	21%	<20%
Programming / coding tools	21%	23%
Peer review	20%	21%

Functionalities	Demand from teachers	Demand from students
Video conferencing integration	<20%	33%
Leadboards	<20%	21%
Levels	<20%	25%
Points	<20%	24%
Rewards	<20%	30%
Blended learning	20%	31%
Brainstorming	<20%	23%

From the table we can see that there is:

- a group of functionalities useful mostly for teachers, such as e.g.: Add new user, Attendance / activity tracking, Self-registration, Email notification settings, Browse list of users
- a group of functionalities useful mostly for students, such as e.g.: Video conferencing integration, Leadboards, Levels, Points, Rewards, and
- a group of functionalities useful for both groups, such as e.g.: E-mail notifications, Teamwork, Can reuse PPTs, PDFs, Videos, LIVE chat, Test / Quiz.

Additionally, it can be said based on the survey results (see the report WP2-A3) that 60% of teachers and 86% of students want to use the e-learning platforms and tools online, and 28% of teachers and 17% of students want to use the e-learning platforms and tools offline.

Moreover, teachers mainly share: PDF, URL, PPT, ZIP, folders and CAD/CAM files.

4.2. E-learning platforms and tools supporting e-learning process

The most useful functionalities were identified (based on the report WP2-A3) and they are shortly described in this section.

Moodle: Moodle is a free and open-source learning management system (LMS) designed to provide educators, administrators and learners with a single robust, secure, and integrated system to create personalized learning environments. Moodle can be used for e-learning projects in universities, workplaces, training centers, schools, and even for personal learning.

MS Teams: Microsoft Teams is a unified communication and collaboration platform that combines persistent workplace chat, video meetings, file storage, and application integration.

It is a part of Microsoft Office 365 and is increasingly being used for online learning and team collaboration in both educational and corporate environments.

Zoom: Zoom is a video conferencing tool that offers high-quality video, audio, and a suite of collaboration features such as chat and screen sharing across mobile devices, desktops, telephones, and room systems. It has gained widespread popularity for its usability and feature set in both education and business settings.

Miro: Miro is a collaborative online whiteboard platform designed for remote and distributed teams. It can be used for brainstorming sessions, strategic planning, and visualizing workflows, making it a useful tool for online learning and collaboration.

YouTube: YouTube is a video sharing service where users can watch, like, share, comment on videos, and subscribe to other users. Educational content from many different sources, including universities and independent educators, can be found here, and educators can create their own channels to share instructional videos.

Google Drive: Google Drive is a file storage and synchronization service developed by Google. It allows users to store files on their servers, synchronize files across devices, and share files. It also includes Google's Office Suite (Docs, Sheets, Slides).

MS Office: Microsoft Office is a suite of desktop applications, servers, and services developed by Microsoft. It includes programs like Word, Excel, PowerPoint, Outlook, and more. Microsoft Office 365, its cloud-based version, includes Teams and OneDrive, enhancing its capabilities for e-learning and online collaboration.

Google Docs: Google Docs is a free, web-based word processing program included as part of the free, web-based Google Docs Editors suite offered by Google within its Google Drive service. It allows for real-time collaboration, making it ideal for group projects and cooperative learning in an online setting.

Wiki: Wiki is a type of website where users can add, modify, or delete its content via a web browser using a simplified markup language or a rich-text editor. Wikis are often used to create collaborative websites and to power community websites.

Facebook: Facebook is a social networking site that makes it easy for people to connect and share with family and friends online. Its group and live video features are often used for creating learning communities and delivering content in an educational context.

4.3. Functionalities included into the e-learning platforms and tools

In this section the functionalities included into the e-learning platforms and tools were summarized. **Table 3** presents which functionalities are included into each e-learning platform / tool. The functionalities closely related to The Evolving Textbook co-creation are bolded.

Table 3 – Functionalities included into the e-learning platforms and tools; in yellow correction done by experts are indicated.

Functionalities	Moodle	MS Teams	Zoom	Miro	YouTube	Google Drive	MS Office	Google Docs	Wiki	Facebook
1. E-mail notifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2. Teamwork	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
3. Can reuse PPTs, PDFs, Videos	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
4. Add new user	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
5. LIVE chat	**Yes**	**Yes**	**Yes**	**Yes**	**Yes (via livestream)**	**No**	**No (via Teams)**	**No**	**No**	**Yes (via Messenger)**
6. Test / Quiz	Yes	No	No	No	No	No	No	No	No	No
7. Attendance / activity tracking	Yes	Yes	Yes	Yes	No	Yes (file access)	Yes (via Teams)	Yes (document access)	No	No
8. Self-registration	Yes	Yes	No	Yes	Yes	**No**	**No**	**No**	Yes	Yes
9. Email notification settings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10. Browse list of users	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes
11. Drag & Drop interaction	**Yes**	**Yes**	**No**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**
12. Lessons	Yes	No	No	No	Yes	No	No	No	No	No
13. Discussion forums	**Yes**	**Yes**	**No**	**No**	**Yes**	**No**	**Yes (via Teams)**	**No**	**Yes**	**Yes**
14. Voting	**Yes**	**Yes**	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**
15. Commenting and feedback	**Yes**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
16. Visual Classroom	No	Yes	Yes	Yes	No	No	No	No	No	No
17. Gradebook	Yes	No	No	No	No	No	No	No	No	No

Functionalities	Moodle	MS Teams	Zoom	Miro	YouTube	Google Drive	MS Office	Google Docs	Wiki	Facebook
18. User login page	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
19. Social media	No	No	No	No	Yes	No	No	No	No	Yes
20. Questionnaires	Yes	No	No	No	No	No	No	No	No	Yes (via Polls)
21. Grade comments	Yes	No	No	No	No	No	No	No	No	No
22. Course backup	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No	No
23. Alerts / notifications	Yes	Yes	Yes	Yes	Yes	**No**	**No**	**No**	Yes	Yes
24. Wikis	**Yes**	**Yes (via Teams)**	**No**	**No**	**No**	**No**	**No**	**No**	**Yes**	**No**
25. Interactive presentations	**Yes**	**Yes**	**No**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**No**	**No**
26. Forum	**Yes**	**Yes**	**No**	**No**	**Yes**	**No**	**Yes (via Teams)**	**No**	**Yes**	**Yes**
27. Tests engine	Yes	No	No	No	No	No	No	No	No	No
28. Asynchronous Self-paced	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
29. Role assignment	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
30. Audio recording	Yes	Yes	Yes	No	Yes	No	No	No	No	Yes
31. Assignment engine	Yes	Yes	No	No	No	No	No	No	No	No
32. Create online video content	No	No	No	No	Yes	No	No	No	No	Yes
33. Survey engine	Yes	No	No	No	No	No	No	No	No	Yes (via Polls)
34. Task Assignment	Yes	Yes	No	Yes	No	Yes	Yes	Yes	No	Yes
35. Upload course	Yes	No	No	No	No	Yes	Yes	Yes	No	No
36. Asynchronous instructor-led	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Functionalities	Moodle	MS Teams	Zoom	Miro	YouTube	Google Drive	MS Office	Google Docs	Wiki	Facebook
37. Synchronous Virtual Classroom	Yes	Yes	Yes	Yes	No	No	No	No	No	No
38. Programming / coding tools	No	No	No	No	No	Yes (Google Colab)	No	Yes (Google Colab)	No	No
39. Peer review	**Yes**	**Yes**	**No**	**Yes**	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
40. Video conferencing integration	Yes	Yes	Yes	Yes	No	**No**	**No**	**No**	No	Yes
41. Leaderboards	Yes	Yes	No	No	No	No	No	No	No	Yes
42. Levels	Yes	Yes	No	No	No	No	No	No	No	No
43. Points	Yes	Yes	No	No	No	No	No	No	No	Yes
44. Rewards	Yes	Yes	No	No	No	No	No	No	No	Yes
45. Blended learning	Yes	Yes	No	Yes	No	Yes	Yes	Yes	Yes	Yes
46. Brainstorming	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
47. Number of functionalities included	**42**	**35**	**15**	**24**	**17**	**21**	**22**	**21**	**18**	**30**

4.4. Benefits and drawbacks of e-learning platforms and tools supporting e-learning process

The main benefits and drawbacks identified for the e-learning platforms and tools are presented in **Table 2**.

Table 2 – Benefits and drawbacks of the e-learning platforms and tools

Tools and applications	Benefits	Drawbacks
Moodle	Highly customizable, wide range of features, free, open-source, good support for assessment and grading	Complexity can be daunting for new users, user interface less modern than some platforms, requires setup and maintenance
MS Teams	Excellent integration with Office 365, robust collaboration features, video conferencing built-in, high security	Can be overwhelming due to many features, occasional technical problems
Zoom	Easy to use, high-quality video and audio, robust free version, breakout rooms feature	Privacy and security concerns, can be demanding on bandwidth
Miro	Excellent for visual collaboration, can replicate many in-person brainstorming activities, easy to use	Free version is limited, best features are paid, less known compared to other platforms
YouTube	Vast amount of educational content, great for self-paced learning, ability to create channels and playlists	Can be distracting, not designed for two-way interaction, requires good internet bandwidth
Google Drive	Real-time collaboration, integrates well with other Google apps, robust free version	Less feature-rich than some other office suites, relies on internet connection
MS Office	Comprehensive suite of applications, standard in many workplaces, integrates well with Teams	Can be expensive, learning curve for some applications

Tools and applications	Benefits	Drawbacks
Google Docs	Real-time collaboration, easy to use, free	Less feature-rich than Microsoft Word, relies on internet connection
Wiki	Great for collaborative work, can be accessed anywhere with an internet connection, easy to use	Quality of information can vary, can be disorganized
Facebook	Large user base, easy to create groups and events, familiar interface for many	Not designed for education, distractions, potential privacy issues

Based on the performed analysis, from The Evolving Textbook co-creation point of view, we can indicate as useful the following e-learning platforms and tools: MS Teams, Google Drive, Google Docs, and Wiki.

4.5. Selection of tools that can be used for teamwork and materials co-creation

This section presents chosen tools that can be used for teamwork and materials co-creation. **Table 3** presents tools, their descriptions and links to the websites on which the tools are available.

Table 3 – Tools that can be used for teamwork and materials co-creation

Tool	Description	Link to the Website
Google Docs	Allows multiple people to edit documents simultaneously.	https://docs.google.com/
Slack	Messaging app for teams that can be used for communication and collaboration.	https://slack.com/
Trello	Collaboration tool that organizes your projects into boards.	https://trello.com/
Microsoft Teams	Chat-based workspace in Office 365 which integrates all the people, content, and tools	https://teams.microsoft.com/

Tool	Description	Link to the Website
	your team needs to be more engaged and effective.	
Asana	Helps teams manage and coordinate their work by assigning tasks and deadlines.	https://asana.com/
Notion	All-in-one workspace where you can write, plan, collaborate and get organized - it allows you to take notes, add tasks, manage projects & more.	https://www.notion.so/
Miro	Online collaborative whiteboarding platform to bring teams together, anytime, anywhere.	https://miro.com/
GitHub	Collaboration platform for code where developers can work together, manage projects, and build software.	https://github.com/
Figma	Cloud-based design tool that allows for simultaneous collaboration.	https://www.figma.com/
Canva	A graphic design tool with collaboration features, allowing team members to co-create and comment.	https://www.canva.com/
Google Slides	Allows multiple people to create and edit presentations simultaneously.	https://docs.google.com/presentation/
Dropbox Paper	A flexible workspace that teams can use to generate ideas, collaborate in real-time, and create documents.	https://www.dropbox.com/
Zoho Docs	An online document management system where you can store all your files securely in a centralized location, and access anywhere online.	https://www.zoho.com/
Basecamp	A project management and team communication software. Free version (Basecamp Personal) available with limited features.	https://basecamp.com/

Tool	Description	Link to the Website
Airtable	A digital platform that uses a spreadsheet interface to help organize content, track tasks, and manage projects.	https://www.airtable.com/
Quip	A collaborative productivity software suite that allows groups of people to create and edit documents and spreadsheets as a group.	https://quip.com/
Jira	An issue tracking product that allows bug tracking and agile project management.	https://www.atlassian.com/software/jira
Mattermost	An open-source, self-hosted Slack-alternative. As an alternative to proprietary SaaS messaging, Mattermost brings all your team communication into one place.	https://mattermost.com/
G Suite	Google's suite of intelligent apps - Gmail, Docs, Drive, Calendar, Hangouts, and more - designed to bring people together.	https://workspace.google.com/
ClickUp	A productivity platform that provides a fundamentally new way to work. More than just task management - ClickUp offers docs, reminders, goals, calendars, and even an inbox.	https://clickup.com/

4.6. Selection of tools that can be used to create tests, quizzes, or questionnaires

This section presents chosen tools that can be used to create tests, quizzes, or questionnaires. **Table 3** presents tools, their descriptions and links to the websites on which the tools are available.

Table 3 – Tools that can be used to create tests, quizzes, or questionnaires

Tool	Description	Link to the Website
Google Forms	Google's tool for creating surveys, quizzes, and forms. Free to use with a Google account.	https://www.google.com/forms/about/

Tool	Description	Link to the Website
Quizlet	Provides learning tools for students, including flashcards, study and game modes. The free version allows quiz creation.	https://quizlet.com/pl
Kahoot	Platform for creating interactive quizzes that can be shared with a group. The basic version is free.	https://kahoot.com/
Microsoft Forms	Similar to Google Forms, a part of Office 365 that allows you to quickly and easily create custom quizzes, surveys, questionnaires, registrations and more.	https://forms.office.com/
SurveyMonkey	Known for survey creation but also allows quizzes. The basic version is free.	https://www.survey monkey.com/
Typeform	Interactive form and survey builder, offers a free plan with limited features.	https://www.typeform.com/
EasyTestMaker	Free tool for teachers to create quality tests. The free version is somewhat limited.	https://www.easytestmaker.com/
Quizizz	Free interactive quizzes for classrooms, also allows for student-paced learning.	https://quizizz.com/
QuizMaker by iSpring	Free software for creating quizzes and surveys. Free version offers unlimited quizzes and surveys.	https://www.ispringsolutions.com/ispring-quizmaker
ProProfs Quiz Maker	Free tool for creating quizzes, tests, and assessments. The free version offers limited features.	https://www.proprofs.com/quiz-school/
GoConqr	Platform for creating quizzes, flashcards, mind maps, and other study aids. Basic version is free.	https://www.goconqr.com/

Tool	Description	Link to the Website
Zoho Survey	This tool allows you to create surveys and questionnaires. The free version has limited features.	https://www.zoho.com/survey/
Slido	Interactive Q&A and polling platform. The basic version is free.	https://www.slido.com/
QuizStar	Free tool that allows instructors to create quizzes for their students.	http://quizstar.4teachers.org/
ClassMarker	Online testing software that offers a free version for creating quizzes.	https://www.classmarker.com/
eSurvey Creator	This tool allows you to create online surveys, polls, and questionnaires. Offers a free plan with limited features.	https://www.surveyhero.com/esurveycreator-is-now-surveyhero
Poll Everywhere	Interactive tool that allows real-time responses to polls, surveys, and quizzes. Free version has limited features.	https://www.polleverywhere.com/
JotForm	Online form builder that allows quizzes and questionnaires. Offers a free plan with limited features.	https://www.jotform.com/

4.7. Selection of tools that can be used to create online video content

This section presents chosen tools that can be used to create online video content. **Table 3** presents tools, their descriptions and links to the websites on which the tools are available.

Table 3 – Tools that can be used to create online video content

Tool	Description	Link to the Website
YouTube Studio	Offers tools for creating, editing, and managing your YouTube videos.	https://studio.youtube.com/

Tool	Description	Link to the Website
Canva	In addition to graphic design, Canva allows for simple video creation and editing in the browser.	https://www.canva.com/
Adobe Spark	Create short video stories in minutes. The basic version is free.	https://www.adobe.com/express/
Biteable	Online video maker with professionally designed templates. Free with Biteable watermark.	https://biteable.com/
ClipChamp	Online video editor with a variety of features. The basic version is free.	https://clipchamp.com/en/
Animoto	Drag-and-drop video maker. The basic version is free.	https://animoto.com/
PowToon	Create animated videos and presentations. Free version available with PowToon branding.	https://www.powtoon.com/
Kapwing	Online tool for creating, editing, and subtitling videos. The basic version is free.	https://www.kapwing.com/
Renderforest	Online branding tools including a video maker. The free version is watermarked.	https://www.renderforest.com/
WeVideo	Cloud-based video creation platform. Free version available with WeVideo watermark.	https://www.wevideo.com/
Lumen5	This tool lets you turn blog posts into videos. Free version available with Lumen5 watermark.	https://lumen5.com/
FlexClip	A simple yet powerful video maker that creates marketing videos and family stories in minutes.	https://www.flexclip.com/
InVideo	Allows you to create professional-quality videos. Free version available with InVideo watermark.	https://invideo.io/

Tool	Description	Link to the Website
Motionbox	A tool for creating and editing short videos, with a focus on videos for social media.	https://motionbox.io/
Wave.video	An online marketing video maker. The free version includes a Wave.video watermark.	https://wave.video/
Wideo	An online video maker with ready-made templates. Offers a free version with limited features.	https://wideo.co/
Hippo Video	A video customer experience platform that allows you to create, edit, and share videos. Free version available with limitations.	https://www.hippovideo.io/
Moovly	Create videos, video presentations, animated videos and more. Free version available with Moovly watermark.	https://www.moovly.com/
Vidyard	A video hosting platform with a free screen recording feature.	https://www.vidyard.com/
Visme	A visual content tool for creating presentations, infographics, and videos. Free version available with Visme watermark.	https://www.visme.co/

4.8. Selection of tools that can be used for brainstorming

This section presents chosen tools that can be used for brainstorming sessions. **Table 3** presents tools, their descriptions and links to the websites on which the tools are available.

Table 3 – Tools that can be used for brainstorming

Tool	Description	Link to the Website
Miro	Collaborative online whiteboard platform	https://miro.com/pl/
Padlet	Virtual bulletin board for notes, images, links	https://padlet.com/

Tool	Description	Link to the Website
MindMeister	Online mind mapping tool	https://www.mindmeister.com/
Google Jamboard	Collaborative virtual whiteboard	https://jamboard.google.com/
Stormboard	Online brainstorming and collaboration tool	https://stormboard.com/home
Trello	Board and card system for project management	https://trello.com/
Coggle	Online tool for creating and sharing mind maps	https://coggle.it/
Bubbl.us	Simple web app for creating mind maps	https://bubbl.us/
Canva	Graphic design tool useful for creating visual aids	https://www.canva.com/pl_pl/
Lucidchart	Web-based diagram software & visual solution	https://www.lucidchart.com/spages/
Mindomo	Online tool for visually outlining complex concepts	https://www.mindomo.com/
GroupMap	Real-time online brainstorming tool for groups	https://www.groupmap.com/
Slack	Communication tool that can be integrated with others for brainstorming	https://slack.com/
Ziteboard	Zoomable online whiteboard with real-time collaboration	https://ziteboard.com/
Ideaflip	Web-based brainstorming tool for capturing and refining ideas	https://ideaflip.com/
Scapple	Free-form text editor for making notes and connecting them	https://www.literatureandlatte.com/ scapple/overview
XMind	Popular mind mapping tool	https://xmind.app/
Mind42	Free online mind mapping software	https://mind42.com/

Tool	Description	Link to the Website
SpiderScribe	Online tool for organizing ideas by connecting notes, files, and calendar events	https://www.spiderscribe.net/
Sketchboard.io	Virtual whiteboard for sketching diagrams and flowcharts	https://sketchboard.io/
Whiteboard Fox	Simple and straightforward online whiteboard	https://r7.whiteboardfox.com/
Microsoft Whiteboard	Free form digital canvas for collaboration	https://www.microsoft.com/en-us/microsoft-365/microsoft-whiteboard/digital-whiteboard-app

5. Collaborative creation of a textbook

5.1. Proposal of the rules of textbook online collaborative creation by a team

Creating a textbook collaboratively online can be a large and complex project. Here are some key rules proposed to guide this process:

- **Establish Roles and Responsibilities**: Everyone should have a defined role in the project, whether it's writing, editing, proofreading, or organizing content. Make sure everyone knows what they're responsible for.
- **Agree on a Style Guide**: Agree on standards for writing and formatting to keep the textbook consistent. This includes capitalization, citation style, etc.
- **Use Collaborative Tools**: Use online tools that allow for real-time collaboration, such as Google Docs (https://docs.google.com/). This allows team members to work together simultaneously and see each other's changes in real-time.
- **Set Deadlines**: Deadlines help keep everyone on track. Establish a timeline for when each section should be completed and stick to it.

- **Regular Communication**: Regularly communicate with your team to ensure everyone is on the same page and to address any issues promptly. This could be through email, video calls, or a dedicated chat channel.
- **Feedback and Revision**: Encourage team members to provide feedback on each other's work. Be open to constructive criticism and use it to improve the quality of the textbook.
- **Consistent Review and Proofreading**: Regular review and proofreading are crucial to ensure the quality of content. Assign someone to this role to ensure every chapter is up to standard.
- **Use a Version Control System**: A version control system can help manage changes to the project over time. This can help avoid confusion and maintain a record of edits.
- **Make Use of Available Resources**: There are many resources available online for content creation. Make use of these resources to create a high-quality textbook.
- **Proper Citation and Avoid Plagiarism**: Always cite sources correctly. Plagiarism is a serious offense and can lead to the discrediting of the entire textbook.
- **Regularly Save and Back-Up Your Work**: This prevents loss of data and ensures you can recover the work in case of any technical mishaps.

5.2. Using the available tools to create a textbook

Online resources can be incredibly beneficial when we are collaboratively creating a textbook. They can provide research material, writing tools, design tools, and more. Here are several types of resources that can be useful:

- **Research Databases and Libraries**: Online databases (e.g. Google Scholar) can be used to find research papers and articles on various topics. Many universities also offer online access to their library resources (e.g. Web of Science, Scopus, IEEE Explore).
- **Open Educational Resources (OERs)**: These are teaching and learning materials that we can freely use and reuse, without charge. Websites like OER Commons (https://oercommons.org/) and OpenStax (https://openstax.pl/) offer textbooks, lesson plans, and more that we can incorporate into your our textbook.
- **Writing Tools**: Tools like Grammarly (https://www.grammarly.com/) can help improve writing by checking for grammar, punctuation, and style errors. Hemingway

App (https://hemingwayapp.com/) can help simplify and improve readability of the text.

- **Image and Graphics Tools**: Websites like Canva (https://www.canva.com/), Adobe Spark (https://express.adobe.com/), and Unsplash (https://unsplash.com/) can be used to create and source images, infographics, and other graphical elements for our textbook.
- **Collaboration Tools**: Google Docs (https://docs.google.com/), Slack (https://slack.com/), Trello (https://trello.com/), and many other online tools can help facilitate communication and collaboration between team members.
- **Reference Management Tools**: Tools like Zotero (https://www.zotero.org/) and Mendeley (https://www.mendeley.com/) can help manage and format citations and bibliographies, which is crucial in academic writing.
- **Plagiarism Check Tools**: Tools like Turnitin (https://www.turnitin.com/) can help ensure the originality of a content.
- **Accessibility Tools**: Tools like the Web Content Accessibility Guidelines (WCAG) (https://userway.org/) can help make your textbook accessible to people with disabilities.
- **eBook Tools**: Once your textbook is written, tools like Calibre (https://calibre-ebook.com/) or Adobe Acrobat (https://www.adobe.com/solutions/ebook.html) can be used to convert the file into an eBook format.
- **Interactive Content Tools**: Tools like H5P (https://h5p.org/) or others presented in previous section of this report allow us to create interactive content like quizzes, flashcards, and interactive videos that can enhance the learning experience.
- **Generative AI**. Tools supporting creation of the content such as Chap GPT, (https://openai.com/) and supporting video creation, such as Pictory AI. (https://pictory.ai/).
- **Subject Matter Experts and Online Communities**: Platforms like Quora (https://www.quora.com/), StackExchange (https://stackexchange.com/), or even LinkedIn (https://www.linkedin.com/) can be valuable places to ask questions or find experts who can provide insight on a particular topic.

By integrating these resources, we can ensure that the textbook is high-quality, engaging, and effective for learning.

6. A proposal of TET platform requirements and limitations

The proposed specification of technical, content, and pedagogical requirements and limitations for The Evolving Textbook are as follow:

- Pedagogical requirements
    - Intended Learning Outcomes (ILOs) (to be defined by a teacher / owner of the textbook). We should present which sections of the textbook are related to the ILOs – micro credentials. Propose creation of ILOs based on Bloom taxonomy, and CONALI Ontology (verb, content, context).
    - Teaching and Learning Activities are related with searching for information, summarizing, synthetizing, combining and presenting the information, reviewing, and improving, that is closely related to the evolving textbook development.
    - Assessment Tasks can be related to quizzes which can be created for each section of the textbook to check how well the reader understood the presented topic.
- MS Office (e.g. MS Word) or Wiki (online document editing platform)
    - Several documents related to different topics can be created.
    - Links which present relations between different documents and different sections of the same document should be introduced.
- Users – roles should be defined for each document by an owner – invitations for collaboration for a document should be sent to other actors. The following roles can be defined:
    - Manager,
    - Owner,
    - Creator,
    - Reviewer, and

- Others.

- Textbook development
  - Tracking changes – identification of a person who introduced changes,
  - Editing or suggesting the changes,
  - Viewing the document and commenting,
  - Approving the changes – identification of a person who approved changes,
  - Versions management (process of archiving),
  - Digital accessibility (e.g. additional description of figures).
- Structure and style of the textbook (template)
  - Fonts types and size, headings, tables, etc.,
  - A tool to create bibliographical references,
  - Links to other sections of the document, other documents, websites, educational platforms /courses related to the topic, etc.,
  - Quizzes (link to a tool to create a quiz),
  - Codes,
  - Responsive design (Versions for computer, tablet, smartphone).
- Supporting tools (to be chosen from existing tools)
  - For brainstorming,
  - For creating,
  - For video creation,
  - For creating animations (e.g. 3D models which can be seen from different perspective),
  - Programming tool,
  - Proofreading,
  - Anti-plagiarism system,
  - Text to speech reader.
- Tasks, timeframe and deadlines – textbook project management
  - Tasks assignment,
  - Time schedule / Gant chart,
  - Delays notifications.

Limitations

We have identified the following limitations:

- Recommendation to use of free supporting tools.
- Cloud storage space (e.g. Should users use their own cloud space? Where to store multimedia?)
- Platform available just for registered users (How to register the users? Self-registration with approval by administrator / teacher? Access through a link sent for collaboration and additional approval?)
- Deployment platforms (supporting accessibility through computer, tablet, smartphone).

The requirements and limitations are presented to take them into consideration in the process of the platform development.

Summary

From the analysis, it can be concluded that the e-learning platform suitable for co-creating The Evolving Textbook:

- should allow several people to work on one document in synchronous and asynchronous way,
- should allow to track changes with the ability to identify the person making these changes,
- should enforce the review of the introduced changes by an authorized person(s),
- ensures that the changes will be visible to others who will know when the changes have been approved, or will be invisible to co-workers until the changes are approved (optional),
- should give the opportunity to comment on the information entered,
- should give the possibility of inserting links to interesting materials / websites / videos.

Moreover, for the designing process we should use Human-Centered Design (HCD) methodology (from WP2-A4).

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