# SOEN 6841

# Software Project Management

## Topic: Personalized Learning Path Generator

## Project Title : LearningCompass

**Submitted to: Prof. Joumana Dargham**
**Teaching Assistant: Chetan Panchal**

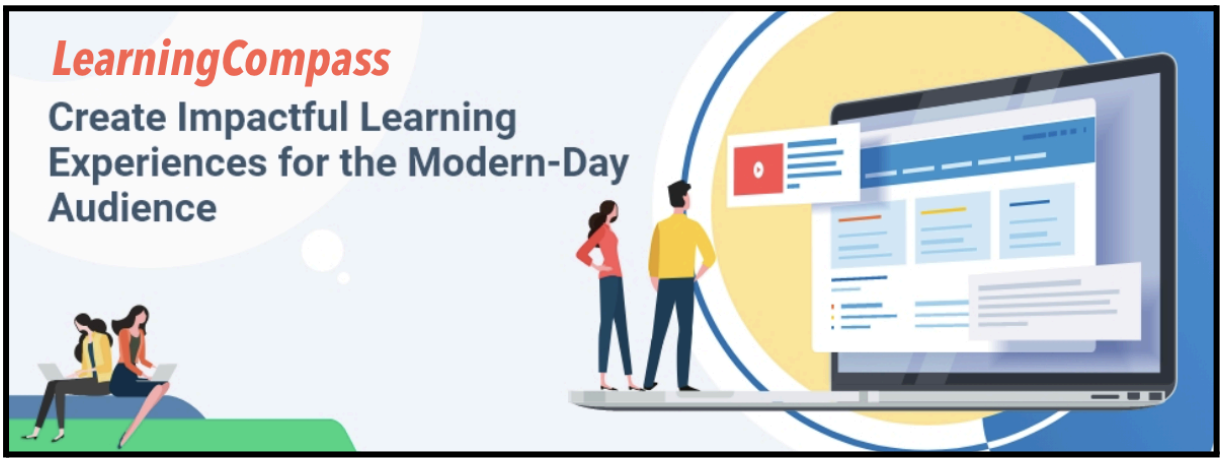

| Team Members : Group 14 | | | |
|---|---|---|---|
| **Name** | **Student ID** | **GitHub Username** | **Email Address** |
| Aksharkumar Yogeshkumar Patel | 40226105 | @aksharpatel17 | axarpatel01@gmail.com |
| Anurag Agarwal | 40232644 | @anuragagarwal6895 | anuragarwal6895@gmail.com |
| Saloni Patel | 40229438 | @salu2303 | saloni230301@gmail.com |
| Vidhi Vinodbhai Sagathiya | 40232374 | @vidhisagathiya | vidhisagathiya028@gmail.com |

**Table of content**


1. Problem Identification.....3
   1.1. Objective:.....3
   1.2. Opportunity Statement:.....3
   1.3. Scope:.....3
   1.4. Stakeholder Analysis:.....4
   1.5. Relevance to Software Solution:.....7

2. Market Analysis Report.....9
   2.1. Objective:.....9
   2.2. Target Audience Identification:.....9
   2.3. Competitor Analysis:.....11
      2.3.1. Key Competitors:.....11
      2.3.2. Price Comparison:.....14
      2.3.3. Features and Capabilities Comparison:.....15
      2.3.4. Strength and Weakness Comparison:.....15
   2.4. Business values:.....16
3. Feasibility Study Report……...19
   3.1. Technical Feasibility.....19
   3.2. Operational Feasibility.....21
   3.3. Economic Feasibility.....22
4. Solution Proposal.....23
   4.1. Introduction .....24
   4.2. Key Features and Functionality.....24
   4.3. Benefits of the Proposed Solution.....25
   4.4. Conclusion.....26
5. Risk Assessment and Mitigation Plan.....27
   5.1. Objective.....27
   5.2. Technical Risks.....27
   5.3. Resources Risks.....28
   5.4. Timeline Risks.....28
   5.5. Financial Risks….....29
   5.6. Regulatory and Compliance Risks.....29
   5.7. Risk Impact and Likelihood Matrix.....30
6. Software Solution Project Plan (WBS).....31
   6.1. Objective.....32
   6.2. Phase 1 - Project Initiation Phase.....32

6.3. Phase 2 - Requirements Gathering Phase.....33
6.4. Phase 3 - Design and Architecture Phase.....33
6.5 Phase 4 - Development Phase.....33
6.6 Phase 5 - Testing Quality Assurance Phase.....34
6.7 Phase 6 - Development and Implementation Phase.....34
6.8 Phase 7 - Monitoring and Maintenance Phase.....34
6.9 Resource and Task Allocation as per WBS.....35
7. Budgeting.....37
7.1. Effort Estimate for each phase per resource.....37
7.2. Development Phase.....38
7.3. Testing and QA Phase.....38
7.4. Yearly Effort Estimation.....39
7.5. Total budget Calculation.....39



# 1. Problem Identification

## 1.1. Objective:

Creating an innovative learning path generator to personalize education, empower users with a guide of diverse resources, and maximize learning success for users.

## 1.2. Opportunity Statement:

In the domain of personalized learning path generation, a significant problem persists: **the lack of integration and synchronization among various educational platforms and resources to deliver truly seamless personalized learning experiences.** While there are existing platforms that offer personalized learning paths, they often operate within isolated ecosystems, limiting access to a comprehensive range of educational resources and hindering the ability to tailor learning paths dynamically based on real-time user feedback and performance data.

## 1.3. Scope:

The scope of addressing the lack of integration and synchronization among various educational platforms and resources to deliver seamless personalized learning experiences involves the development of a comprehensive software solution that bridges the gap between disparate educational ecosystems. This solution aims to facilitate the aggregation, integration, and synchronization of diverse educational resources from multiple platforms, enabling the seamless creation and adaptation of personalized learning paths based on real-time user feedback and performance data.

Key Components of the Scope:

1. **Platform Integration:**
    a. Implement APIs, data connectors, and interoperability standards to facilitate seamless data exchange and synchronization between the solution and external educational platforms.

2. **Resource Aggregation:**
    a. Design algorithms and data pipelines to aggregate educational resources from various sources, including text-based content, multimedia materials, interactive exercises, and simulations.
    b. Implement data ingestion mechanisms to retrieve, catalog, and organize educational content based on metadata attributes such as subject, topic, difficulty level, and format.

3. **User Profiling and Preferences:**
    a. Implement machine learning algorithms and data analytics techniques to derive insights from user data and generate personalized learner profiles.

4. **Dynamic Learning Path Generation:**
    a. Utilize real-time user feedback, interaction data, and performance metrics to adapt and refine learning paths continuously.

5. **User Interface and Experience:**
    a. Implement features for user feedback, progress tracking, goal setting, and collaboration to enhance user engagement and satisfaction.

6. **Performance Monitoring and Analytics:**
    a. Incorporate monitoring and analytics capabilities to track the performance, effectiveness, and impact of personalized learning paths.

7. **Security and Privacy:**
    a. Implement robust security measures to protect user data, including encryption, authentication, access controls, and compliance with data privacy regulations.

## 1.4. Stakeholder Analysis:

The below are the list of stakeholders:

1. **<u>Students/ Learners</u>:**
    a. ***Interests****:* Learners are interested in accessing a wide range of educational resources seamlessly and receiving personalized learning experiences tailored to their needs, preferences, and learning styles. They value flexibility, convenience, and the ability to track their progress and achievements.
    b. ***Concerns****:* Learners may be concerned about the privacy and security of their personal data, including their learning preferences and performance metrics. They may also worry about the reliability and accuracy of personalized recommendations and the potential for algorithmic bias.

2. **<u>Educators and Trainers:</u>**
    a. ***Interests****:* Educators and trainers aim to provide effective and engaging learning experiences for their students. They are interested in tools and platforms that enable them to tailor instruction to individual student needs, track student progress, and assess learning outcomes. They value access to a diverse range of educational resources and the ability to collaborate with other educators.
    b. ***Concerns****:* Educators may be concerned about the time and effort required to learn and adopt new technologies. They may also worry about the quality and relevance of recommended resources and the potential for technology to replace traditional teaching methods.

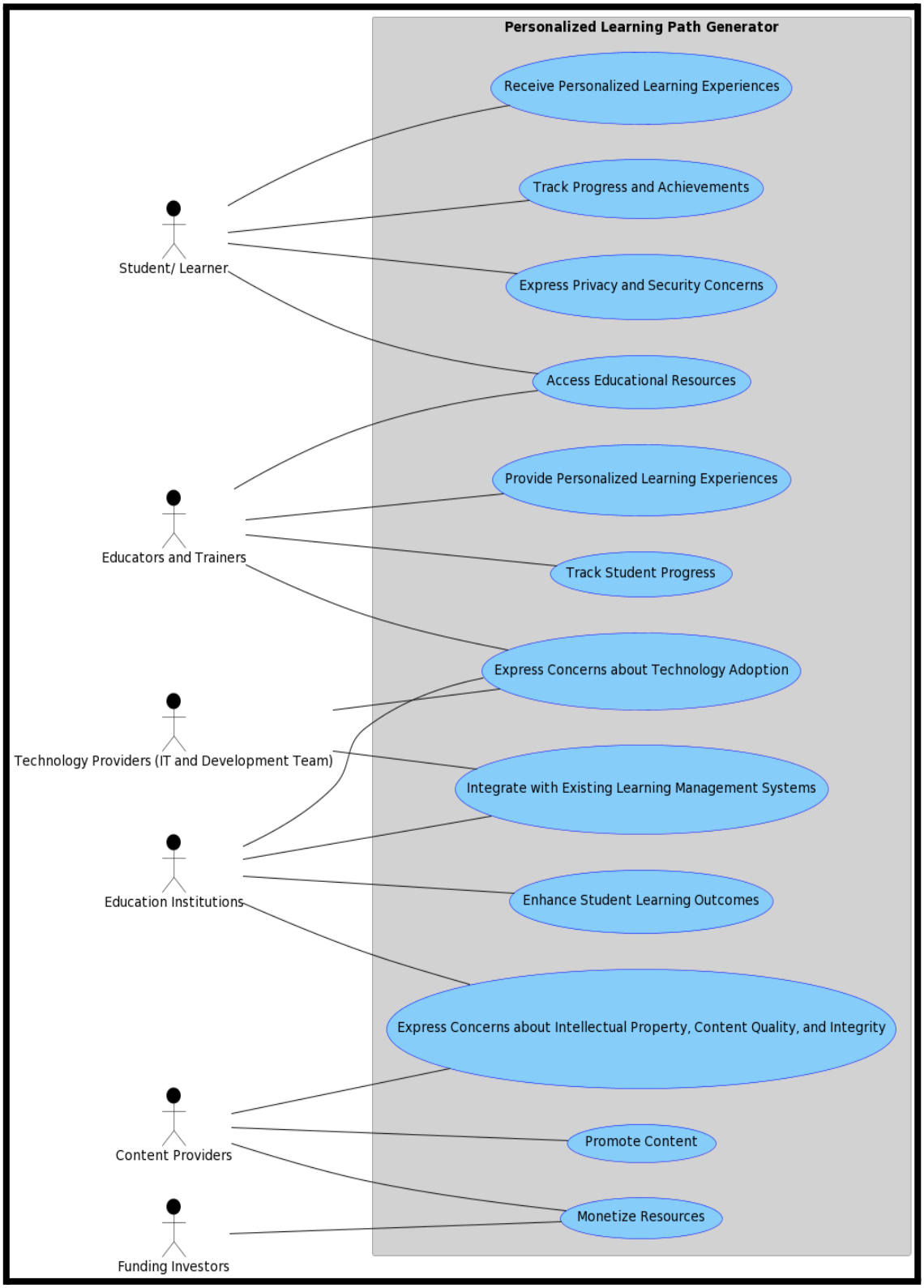
3. **Educational Institutions:**
    a. ***Interests****:* Educational institutions seek to enhance student learning outcomes, improve student retention rates, and differentiate themselves in a competitive market. They are interested in solutions that can integrate seamlessly with existing learning management systems (LMS) and support institutional goals for personalized learning and academic success.
    b. ***Concerns****:* Educational institutions may be concerned about the cost and scalability of implementing new technology solutions. They may also worry about data security and compliance with privacy regulations, as well as the potential for technology to exacerbate inequalities in access to education.

4. **Content Providers:**
    a. ***Interests****:* Content providers aim to reach a broader audience of learners and monetize their educational resources effectively. They are interested in platforms that can promote their content, drive user engagement, and generate revenue through subscription models, licensing agreements, or advertising.
    b. ***Concerns****:* Content providers may be concerned about maintaining control over their intellectual property and ensuring fair compensation for their work. They may also worry about the quality and integrity of their content when integrated into third-party platforms.

5. **Technology Providers (IT & Development Team):**
    a. ***Interests:*** Interested in showcasing expertise, innovative technology integration, mutual benefits, revenue-sharing opportunities. Prioritize scalability, reliability, and performance optimization for seamless user experiences during peak usage periods.
    b. ***Concerns:*** Worried about technical feasibility, integration challenges, data security, privacy risks, compatibility, interoperability, scalability, and performance under increased demand.

6. **Investors and Funding Organizations:**
    a. ***Interests:*** Keen on scalability and market potential, understanding market demand, differentiation factors. Seek sustainable revenue streams, regulatory compliance, and data security measures to mitigate privacy risks.
    b. ***Concerns:*** Concerned about long-term sustainability, profitability, regulatory compliance, competitive threats, market saturation, execution risks, technical challenges, resource constraints, and effective project management.

# Use case diagram of Stakeholders:



## 1.5. Relevance to Software Solution:

There is an opportunity to revolutionize personalized learning by developing a software solution that seamlessly integrates educational platforms and resources. This solution can optimize the delivery of personalized learning experiences, improve access to a diverse range of resources, and enhance the effectiveness of dynamic learning path adaptation.

**Software Solution:**

1. **User-Centered Design (UCD):**
    - Problem Addressed: The challenge of designing a user-friendly and intuitive software solution that meets the diverse needs and preferences of learners, educators, and administrators.
    - Software Solution Proposed: Implement a user-centered design (UCD) approach to prioritize user needs, preferences, and usability throughout the software development lifecycle. Conduct user research, personas development, and usability testing to ensure that the software solution is intuitive, accessible, and engaging for all stakeholders.

2. **Agile Development Process:**
    - Problem Addressed: The need for iterative development and continuous improvement to address evolving user needs and requirements in the dynamic field of personalized learning.
    - Software Solution Proposed: Adopt an agile development process, such as Scrum or Kanban, to facilitate iterative development, frequent feedback cycles, and adaptive planning. This approach enables the development team to respond quickly to changes, incorporate user feedback, and deliver incremental updates to the software solution.

3. **Continuous Integration and Deployment (CI/CD):**
    - Problem Addressed: The need for efficient and reliable deployment processes to deploy updates, enhancements, and bug fixes to the software solution without disrupting user experience.
    - Software Solution Proposed: Implement continuous integration and deployment (CI/CD) pipelines to automate build, test, and deployment processes. This ensures that changes to the software solution are thoroughly tested and deployed seamlessly, enabling rapid and reliable delivery of new features and improvements.

4. **Microservices Architecture:**
    - Problem Addressed: The complexity of integrating multiple educational platforms and resources can be challenging within a

monolithic architecture, leading to issues such as scalability and maintainability.

- Software Solution Proposed: Adopt a microservices architecture to decompose the software solution into smaller, independent services that can be developed, deployed, and scaled independently. Each microservice can focus on a specific functionality, such as user management, content aggregation, recommendation engine, and analytics, allowing for greater flexibility and agility in integrating and evolving the system.

5. **Adaptive Learning Algorithms:**
    - Problem Addressed: Traditional personalized learning approaches may lack adaptability and responsiveness to individual learner needs and preferences in real-time.
    - Software Solution Proposed: Develop adaptive learning algorithms that continuously monitor user interactions, performance metrics, and contextual factors to dynamically adjust learning paths and content recommendations. By leveraging machine learning and AI techniques, such as reinforcement learning or deep learning, the software solution can adaptively tailor learning experiences to optimize engagement and effectiveness for each learner.

6. **Quality Assurance (QA) and Testing:**
    - Problem Addressed: The importance of ensuring the reliability, performance, and security of the software solution to deliver a seamless personalized learning experience.
    - Software Solution Proposed: Establish robust quality assurance (QA) and testing processes to identify and address issues related to functionality, performance, security, and compatibility. Conduct thorough testing, including unit testing, integration testing, regression testing, and security testing, to ensure the quality and reliability of the software solution.

**Initial Scope:**

- **Input**: Aggregating educational resources and user data.
- **Output**: Generating personalized learning paths and summaries.
- **User Interface**: Designing intuitive interfaces for user interaction.
- **Integration**: Integrating with diverse educational platforms and repositories.

# 2. Market Analysis Report

## 2.1 Objective:

The market analysis objective for the Personalized Learning Path Generator is to thoroughly explore the educational landscape and understand the current offerings and challenges in personalized learning solutions. This includes identifying the needs and preferences of learners across various age groups and educational backgrounds. Additionally, we aim to assess the effectiveness of existing learning resources and platforms in meeting individual learners' needs and goals. By examining market trends and emerging methodologies in educational technology, our objective is to demonstrate the demand for tailored learning experiences and the potential for significant improvements in learner engagement and outcomes. Ultimately, the goal is to highlight the value proposition of our personalized learning solution and its ability to address the diverse learning needs of students, professionals, and lifelong learners.

## 2.2 Target Audience Identification:

In the realm of personalized learning, our target audience spans a diverse spectrum of learners and educators alike, each with unique aspirations and learning objectives. From students navigating their academic journey to professionals seeking to stay ahead in their careers, educators enhancing their teaching methodologies, and lifelong learners pursuing intellectual growth, our Learning Path Generator caters to a wide range of individuals hungry for knowledge and growth. Whether it's a career changer looking to pivot or an entrepreneur striving for success, our platform offers curated learning paths tailored to meet their specific needs, fostering a community of lifelong learners committed to continuous improvement and advancement.
The primary target audience includes :

1. **Students:** Students seeking academic achievement, exam preparation, and skill development. This group comprises both traditional students, such as those enrolled in schools, colleges, and universities, as well as non-traditional students who may be pursuing online courses or alternative educational pathways.

2. **Professionals:** Working professionals with busy schedules, seeking flexible, self-paced learning options for career advancement. Professionals from various industries utilize the Learning Path Generator to stay competitive in their fields by acquiring new skills, staying updated with industry trends, and obtaining certifications relevant to their career advancement.

3. **Educators:** Teachers and instructors looking to improve classroom instruction through customized learning resources. Teachers, instructors, and trainers form a crucial user group who leverage the Learning Path Generator to enhance their teaching methodologies, design comprehensive curricula, and

access supplemental resources for classroom instruction. They can discover innovative teaching techniques, explore new topics, and create customized learning experiences for their students by utilizing the platform's vast repository of educational materials.

4. **Lifelong Learners:** Individuals of varied ages exploring learning opportunities for personal enrichment and cognitive health. This category encompasses individuals who have a perpetual thirst for knowledge and personal growth, irrespective of their age or educational background. Lifelong learners use the Learning Path Generator to explore diverse subjects, pursue their intellectual interests, and engage in continuous self-improvement.

5. **Career Changers:** Career changers are embarking on new career paths, seeking opportunities for growth and development. These users rely on the Learning Path Generator to identify the necessary skills and knowledge required for their desired career path, map out a strategic learning trajectory, and gain the expertise needed to successfully pivot into a different professional domain.

6. **Entrepreneurs:** Entrepreneurs are driven by their vision, constantly seeking new knowledge and skills to fuel their ventures. Entrepreneurs and aspiring business owners utilize the Learning Path Generator to acquire essential skills related to entrepreneurship, such as business planning, marketing strategies, financial management, and leadership development.

| Target Audience | Demographic Characteristics | Psychographic Characteristics |
|---|---|---|
| **Students** | Age: 5-18 (K-12) or 18-24 (college/university) | Learning preferences: Visual, auditory, kinesthetic; Academic achievement goals |
| | Education: Primary, secondary, or tertiary education | Learning goals: Exam preparation, skill development; Technological proficiency |
| **Professionals** | Age: 25-65 | Continuing education needs: Professional development, career advancement |
| | Occupation: Various industries | Time constraints: Busy schedules, flexible learning options |
| **Lifelong Learners** | Age: 25-65+ | Personal enrichment: Pursuing |

| | | |
|---|---|---|
| | | hobbies, maintaining mental acuity |
| | Education: Varied | Learning preferences: Curiosity-driven, exploratory experiences |
| **Educators and Trainers** | Age: 25-65+ | Professional development: Enhancing teaching methods, curriculum design |
| | Occupation: Teachers, instructors, educational roles | Access to resources: Seeking supplemental materials for classroom instruction |
| **Parents and Guardians** | Age: 25-55 | Academic support: Assisting children's learning, technological adoption |
| | Parental status: Parents, guardians, caregivers | Supplemental education: Providing resources outside of formal education |
| **Career Changers** | Age: 18-65 | Career transition: Upskilling, reskilling for new job opportunities |
| | Education: Varied | Adaptability: Embracing change, pursuing new learning pathways |
| **Entrepreneurs** | Age: 25-65+ Business | Business development: Skill acquisition for entrepreneurship, innovation |
| | status: Business owners, startup founders | Strategic thinking: Navigating challenges, seizing opportunities |

## 2.3 Competitor Analysis:

### 2.3.1. Key Competitors

Below are the few Competitors available in the market :

1. **Coursera:**
    - Offers personalized learning paths based on user preferences, career goals, and skill levels.
    - Provides a vast library of courses from leading universities and institutions worldwide.
    - Utilizes machine learning algorithms to recommend relevant courses and learning materials.
    - Features interactive quizzes, assessments, and projects to track progress and ensure mastery of concepts.

- Offers certificates upon course completion to validate skills and enhance employability.

2. **Udemy:**
   - Employs a personalized recommendation system to suggest courses based on user interests, browsing history, and learning objectives.
   - Hosts a diverse range of courses spanning various subjects, including technology, business, and creative arts.
   - Allows instructors to create custom learning paths by curating courses into comprehensive learning bundles.
   - Offers lifetime access to purchased courses, enabling learners to revisit materials and reinforce learning at their own pace.
   - Provides a platform for interaction with instructors and peers through discussion forums and messaging features.

3. **LinkedIn Learning:**
   - Delivers personalized learning experiences through curated course recommendations tailored to individual career aspirations and skill gaps.
   - Integrates with users' LinkedIn profiles to provide targeted learning paths aligned with industry trends and job requirements.
   - Offers courses led by industry experts, covering topics such as leadership, technology, and professional development.
   - Provides assessments and quizzes to evaluate skill proficiency and track learning progress over time.
   - Grants access to a vast library of on-demand video tutorials and learning resources accessible on multiple devices.

4. **Pluralsight:**
   - Utilizes skill assessment tests to identify areas of strengths and weaknesses, enabling users to create personalized learning paths.
   - Offers a vast array of courses in technology-related fields, including software development, IT operations, and cybersecurity.
   - Features hands-on learning experiences with interactive labs, projects, and coding exercises to reinforce concepts.
   - Provides skill measurement tools to track progress and quantify skill development over time.
   - Offers certification paths and badges to validate proficiency and showcase expertise to potential employers.

5. **Khan Academy:**
   - Tailors learning experiences to individual needs and learning styles through adaptive practice exercises and personalized recommendations.
   - Offers a comprehensive library of instructional videos and interactive lessons across subjects like math, science, humanities, and test prep.

- Provides progress tracking tools and performance analytics to monitor proficiency and identify areas for improvement.
- Offers mastery-based learning with the ability to revisit concepts until mastery is achieved.
- Free and accessible to learners of all ages, making education more inclusive and accessible globally.

6. **edX:**
   - Offers personalized learning paths through its MicroMasters programs and Professional Certificate programs, allowing learners to acquire skills in specific areas of interest.
   - Partners with leading universities and institutions to offer high-quality courses across various disciplines, including business, computer science, and engineering.
   - Utilizes adaptive learning technologies to tailor course content and assessments to individual learner needs.
   - Provides verified certificates and micro-credentials upon completion of courses and programs, enhancing learners' credibility and employability.
   - Offers a global community of learners, enabling collaboration and networking opportunities with peers and experts.

7. **Skillshare:**
   - Curates personalized learning paths based on user interests, preferences, and skill levels, offering a wide range of creative and practical courses.
   - Features classes in design, photography, writing, entrepreneurship, and more, taught by industry professionals and creatives.
   - Provides project-based learning experiences, encouraging hands-on application of skills learned.
   - Offers a subscription-based model with unlimited access to courses, allowing learners to explore diverse topics and interests.
   - Fosters a sense of community through peer feedback, discussions, and collaborations within the Skillshare platform.

### 2.3.2. Price Comparison between the Learning Path Generator competitors :

| Competitor | Price (CAD) | Free but Limited | Unique Selling Points |
|---|---|---|---|
| Coursera | $45 | Yes | Vast selection of courses from top universities and industry leaders, certificates and degrees offered, specialization tracks, mobile app. |
| Udemy | $37 | Yes | Large marketplace of courses covering diverse topics, frequent discounts and promotions, lifetime access to purchased courses, user reviews and ratings. |
| LinkedIn Learning | $34 (monthly) / $315 (annual) | Yes | Integration with Linkedin profiles, curated learning paths, industry-relevant content, certificates of completion, personalized recommendations. |
| Pluralsight | $42 (monthly) / $385 (annual) | Yes | recommendations<br>Focus on technology and professional skills development, hands-on learning experiences, skill assessments, paths and channels. |
| Khan Academy | Free | Yes | Extensive library of educational videos and exercises, personalized learning dashboard, progress tracking, interactive content. |
| edX | $45 | Yes | Courses from prestigious universities and institutions, micro-masters and professional certificate programs, flexible learning options, financial aid available. |
| Skillshare | $23 (monthly) / $179 (annual) | Yes | Creative and entrepreneurial-focused courses, project-based learning, community features, offline viewing, member-exclusive benefits. |

### 2.3.3. Features and Capabilities comparison:

The below table shows the Comparison of Features and Capabilities of among competitors:

| Features | LinkedIn Learning | Udemy | Khan Academy | Coursera |
|---|---|---|---|---|
| Personalized Learning Paths | ✓ | ✓ | ❌ | ✓ |
| Adaptive Recommendation Engine | ❌ | ❌ | ❌ | ✓ |
| Integration with Learning Platforms | ✓ | ✓ | ✓ | ✓ |
| Progress Tracking | ✓ | ✓ | ❌ | ✓ |
| Community Collaboration | ❌ | ✓ | ❌ | ❌ |
| Mobile Accessibility | ✓ | ✓ | ✓ | ✓ |
| Certification and Badging | ✓ | ✓ | ❌ | ✓ |

### 2.3.4. Strength and Weakness Comparison

The below table shows the Comparison of Strength and Weakness among competitors:

| Competitor | Strengths | Weaknesses | Opportunities |
|---|---|---|---|
| coursera | - Personalized learning paths<br>- Vast library of courses<br>- Machine learning for recommendations | - Higher pricing compared to some competitors<br>- Limited focus on practical skills | - Expansion into new markets/industries<br>- Partnerships for skill development programs |
| udemy | - Personalized course recommendations<br>- Diverse range of courses<br>- Custom learning paths | - Quality control issues with some courses<br>- Overemphasis on sales/marketing | - Expansion into corporate training markets<br>- Enhanced course quality |
| LinkedIn Learning | - Personalized learning<br>- Curated course recommendations aligned with career goals<br>- Integration with LinkedIn profiles | - Higher pricing compared to some competitors<br>- Limited free content available | - Development of niche content |
| Khan Academy | - Adaptive practice exercises<br>- Comprehensive library of educational videos and lessons<br>- Progress tracking tools | - Limited focus on advanced or specialized topics<br>- Not as recognized for professional development | - Expansion into new subjects or educational levels<br>- Partnerships with educational institutions |

## 2.4 Business values:

**1. <u>Unique Selling Points (USPs):</u>**

1. **Personalized Learning Paths:**
    a. *Tailored Learning Journeys:* Our platform crafts customized learning paths tailored to individual goals, preferences, and learning styles, ensuring optimal engagement and knowledge retention.
    b. *Adaptive Content Curation:* Leveraging advanced algorithms, we dynamically adjust course recommendations and learning materials based on real-time user interactions and performance feedback, ensuring relevance and effectiveness.

2. **Comprehensive Course Catalog**:
    a. *Curated by Experts:* Access an extensive selection of courses curated by industry experts, renowned academics, and leading institutions, covering a diverse range of subjects and disciplines.
    b. *Quality Assurance:* Each course undergoes rigorous vetting to ensure high-quality content, relevance, and alignment with industry standards and best practices, providing users with unparalleled learning resources.

3. **Adaptive Recommendation Engine**:
    a. *AI-Powered Personalization:* Our AI-driven recommendation engine analyzes user behavior, preferences, and learning patterns to deliver targeted course suggestions and learning materials tailored to individual needs, maximizing learning outcomes.
    b. *Continuous Improvement:* With machine learning algorithms, the recommendation engine continuously learns and evolves, refining its recommendations over time to adapt to changing user requirements and preferences.

4. **Seamless Integration**:
    a. *Interoperability Excellence:* Seamlessly integrate our platform with existing learning management systems (LMS), educational tools, and third-party platforms, facilitating smooth data exchange and interoperability for enhanced user experience and administrative efficiency.
    b. *API Accessibility:* Our robust APIs and interoperability standards ensure easy integration with a wide range of educational ecosystems and technology infrastructures, enabling effortless adoption and scalability.

**2. <u>Value Proposition:</u>**

1. **Personalized Learning:**
    a. *Tailored to Your Needs*: Experience efficient and effective learning paths personalized to your unique goals, interests, and preferences, empowering you to achieve your learning objectives with greater ease and satisfaction.

b. *Individualized Support:* Receive targeted guidance and support throughout your learning journey, with personalized recommendations, feedback, and resources tailored to your evolving needs and learning style.

2. **Extensive Course Selection:**
    a. *Unparalleled Diversity:* Gain access to a vast library of high-quality courses spanning diverse subjects, industries, and skill levels, curated by experts and institutions from around the world, ensuring comprehensive coverage of your learning interests and objectives.
    b. *Endless Possibilities*: Explore new areas of interest, deepen your expertise, or pivot into new career paths with confidence, knowing that our extensive course selection provides limitless opportunities for personal and professional growth.

3. **Adaptive Recommendations:**
    a. *Guided Learning Experience:* Benefit from guided learning experiences that adapt to your individual needs, preferences, and proficiency levels, with tailored course recommendations and learning materials that evolve in real-time to optimize your learning journey.
    b. *Personalized Progression*: Progress at your own pace and comfort level, with adaptive recommendations that help you navigate through course content, topics, and exercises based on your learning progress and mastery of concepts.

4. **Seamless Integration:**
    a. *Hassle-Free Access*: Enjoy seamless access to our platform across multiple devices and environments, with intuitive interfaces and interoperable integrations that ensure effortless navigation, data synchronization, and user experience consistency.
    b. *Unified Learning Ecosystem*: Seamlessly integrate our platform with your existing educational tools, systems, and workflows, creating a unified learning ecosystem that streamlines administrative tasks, enhances collaboration, and maximizes resource utilization.

**3. <u>Consistent Messaging:</u>**

Unified in our commitment to revolutionize education, we orchestrate a symphony of consistent messaging across every channel. From our vibrant marketing materials to the immersive experience of our website and beyond, our aim is clear: to resonate deeply with our audience, echoing the unparalleled value and transformative potential of our Personalized Learning Path Generator. We don't just communicate features; we weave narratives that inspire, inform, and ignite curiosity. Through this harmonious consistency, we not only articulate the benefits of our platform but also craft an indelible imprint of our brand identity, fostering trust and loyalty among learners and educators alike.

**4. User Testimonials and Case Studies:**

Our journey towards educational empowerment is defined by the real-world successes and transformative experiences of our users. Through authentic testimonials and compelling case studies, we showcase how the Personalized Learning Path Generator has revolutionized learning experiences, empowered educators, and propelled students towards academic excellence. These narratives serve as testament to the effectiveness and impact of our platform, illustrating its ability to address specific challenges, cater to diverse learning needs, and foster tangible results. By sharing these stories, we aim to inspire confidence and enthusiasm among prospective users, encouraging them to embark on their own journey of personalized learning.

**5. Continuous Improvement:**

As pioneers in the field of personalized education, we are committed to perpetual innovation and enhancement of the Personalized Learning Path Generator. We embrace feedback as a catalyst for growth, continually refining and expanding our platform to meet the evolving needs of learners, educators, and educational institutions. With an agile development approach, we remain responsive to user insights, technological advancements, and emerging trends in education. This proactive stance enables us to stay at the forefront of personalized learning solutions, delivering cutting-edge features, and transformative experiences. Through a culture of continuous improvement, we strive to empower every learner on their path towards academic success.

# Feasibility Study Report:

## 1. Technical Feasibility:

**Technology Stack Analysis**
The technology stack that was selected, which consists of libraries, frameworks, and programming languages, is in line with industry best practices and provides strong assistance in creating software that is feature-rich and scalable.
For example, utilizing Python for backend development provides flexibility, ease of integration, and access to a vast ecosystem of libraries and frameworks like Django or Flask.

**Infrastructure Requirements**
The necessary infrastructure is easily accessible and scalable, and includes relational databases like PostgreSQL or MySQL, cloud hosting services like AWS or Azure, and version control systems like Git.
These technologies ensure top performance even during periods of high demand because of their excellent dependability, performance, and scalability.

**Integration Challenges**
It is possible to integrate with third-party learning systems and APIs via data connectors, interoperability standards, and well-documented APIs. Our Application and other platforms may share data and synchronize easily by utilizing industry-standard protocols like OAuth and RESTful APIs. This improves user experience and makes material more accessible.

**Scalability and Performance**
Scalability and elasticity are provided by the cloud-based infrastructure and microservices architecture to manage growing user loads and future expansion. The system may dynamically distribute resources based on demand by utilizing load balancers and auto-scaling features, which guarantees consistent performance and responsiveness.

**Security Considerations**
Strong security measures reduce the danger of data breaches and illegal access. These measures include encryption, access limits, and compliance with data privacy rules. The confidentiality, integrity, and availability of user data are guaranteed by the Learning Path Generator through the use of security best practices and frequent security assessments.

**Technologies Required:**

**Backend Development:**

**Programming Language:**
- Python
- JavaScript (Node.js) or Java

**Web Framework:**
- Django (Python)
- Flask (Python)
- Express.js (Node.js)
- Spring Boot (Java)

**RESTful API Framework:**
- Django REST Framework (Python)
- Flask-RESTful (Python)

**Machine Learning Frameworks (for adaptive learning algorithms):**
- TensorFlow
- scikit-learn
- PyTorch

**Frontend Development:**
- HTML5
- CSS3 (with preprocessors like Sass or Less)
- JavaScript (ES6+)

**Frontend Frameworks/Libraries:**
- React.js
- Angular
- Vue.js

**State Management:**
- Redux (with React.js)
- Vuex (with Vue.js)
- Context API (with React.js)

**Database**:
- Relational Database Management System (RDBMS):
    - PostgreSQL, SQLite (for development)

**Infrastructure**:
- Cloud Platform: Amazon Web Services (AWS), Microsoft Azure

**Security**:

- Encryption:
- TLS/SSL for data in transit

**Other Tools and Technologies:**

- Version Control : Git (GitHub, GitLab, Bitbucket)
- Continuous Integration/Continuous Deployment (CI/CD): Jenkins, CircleCI, GitHub Actions
- Monitoring and Logging: Prometheus, Grafana, ELK Stack (Elasticsearch, Logstash, Kibana)
- Collaboration and Communication: Slack, Microsoft Teams, Zoom

## Operational Feasibility

**Resource Availability**

Experienced professionals skilled in software development, database management, UX/UI design, quality assurance, and project management are accessible either internally or through outsourcing partners. By assembling a diverse team with a range of expertise, the project can leverage different perspectives and knowledge to deliver a top-notch solution.

**Training Needs**

Training programs and documentation will be provided to users, administrators, and support staff to familiarize them with the Learning Path Generator's features, functionalities, and best practices. Through thorough training initiatives, the project ensures that users are comfortable with the system, reducing any resistance to change and maximizing its use.

**Change Management**

Change management strategies, such as communication plans, stakeholder engagement, and user feedback mechanisms, will facilitate a smooth transition and acceptance of the new software solution. By involving stakeholders early on, addressing concerns, and gathering feedback, the project encourages collaboration and continuous improvement.

**Support and Maintenance**

Dedicated support and maintenance teams will be set up to handle user inquiries, resolve issues, and provide ongoing system updates and improvements. By offering timely and responsive support services, the project aims to keep users satisfied, maintain system reliability, and uphold service level agreements (SLAs), thereby building trust and loyalty among users.

## Potential Challenges and Benefits:

**Challenges:**
- Making sure everyone gets enough training
- Helping people embrace the changes
- Being available to help when users need support

**Benefits**:
- Bringing together different skills and knowledge
- Making users feel comfortable and confident using the system
- Making sure changes happen smoothly
- Being there to help whenever users need it

**Economic Feasibility**

**Cost-Benefit Analysis:**
We've done a thorough cost-benefit analysis to see if the Learning Path Generator project makes financial sense. We've looked at how much it'll cost to develop and run the project, compared to the potential benefits like better learning outcomes and increased user engagement. This helps everyone involved understand if the project is economically viable and what kind of value it brings.

**Return on Investment (ROI)**
The projected ROI of the Learning Path Generator is derived from its ability to enhance learning outcomes, increase user engagement, and generate revenue through subscription fees, licensing agreements, or advertising. By delivering personalized learning experiences, optimizing resource utilization, and fostering a community of lifelong learners, the project creates tangible value for users, educational institutions, and content providers, resulting in long-term sustainability and profitability.

**Revenue Generation**
Diverse revenue streams, including subscription fees, licensing agreements, advertising, or partnerships, offset development and operational costs and generate sustainable income. By monetizing the platform's features, content, and user base, the project diversifies its revenue sources, minimizes financial risks, and maximizes profitability, ensuring long-term viability and growth.

# Solution Proposal

**Introduction:**
The Personalized Learning Path Generator is a pioneering software solution designed to revolutionize the way individuals engage with educational content and achieve their learning goals. By addressing the persistent challenges in personalized learning experiences, our platform offers a comprehensive set of features and functionalities aimed at maximizing user engagement, satisfaction, and success. Through advanced algorithms, seamless integration with diverse educational platforms, and user-centric design principles, our solution empowers learners, educators, and educational institutions to navigate their learning journey with precision and efficacy.

**Key Features and Functionalities:**

**1. Personalized Learning Paths:**

1. **Tailored Learning Journeys:** Our platform crafts customized learning paths tailored to individual goals, interests, and learning styles, ensuring optimal engagement and knowledge retention.
2. **Adaptive Content Curation:** Leveraging advanced algorithms, we dynamically adjust course recommendations and learning materials based on real-time user interactions and performance feedback, ensuring relevance and effectiveness.

**2. Comprehensive Course Catalog:**

1. **Curated by Experts:** Access an extensive selection of courses curated by industry experts, renowned academics, and leading institutions, covering a diverse range of subjects and disciplines.
2. **Quality Assurance:** Each course undergoes rigorous vetting to ensure high-quality content, relevance, and alignment with industry standards and best practices, providing users with unparalleled learning resources.

**3. Adaptive Recommendation Engine:**

1. **AI-Powered Personalization:** Our AI-driven recommendation engine analyzes user behavior, preferences, and learning patterns to deliver targeted course suggestions and learning materials tailored to individual needs, maximizing learning outcomes.
2. **Continuous Improvement:** With machine learning algorithms, the recommendation engine continuously learns and evolves, refining its recommendations over time to adapt to changing user requirements and preferences.

**4. Seamless Integration:**

1. **Interoperability Excellence:** Seamlessly integrate our platform with existing learning management systems (LMS), educational tools, and third-party platforms,

facilitating smooth data exchange and interoperability for enhanced user experience and administrative efficiency.

2. **API Accessibility:** Our robust APIs and interoperability standards ensure easy integration with a wide range of educational ecosystems and technology infrastructures, enabling effortless adoption and scalability.

**Benefits of the Proposed Solution:**

**1. Tailored Learning Experiences:**

1. **Efficient and Effective Learning Paths:** Experience personalized learning journeys tailored to unique goals, interests, and learning styles, empowering users to achieve their learning objectives with greater ease and satisfaction.
2. **Individualized Support:** Receive targeted guidance and support throughout the learning journey, with personalized recommendations, feedback, and resources tailored to evolving needs and learning preferences.

**2. Extensive Course Selection:**

1. **Unparalleled Diversity:** Gain access to a vast library of high-quality courses spanning diverse subjects, industries, and skill levels, curated by experts and institutions worldwide, ensuring comprehensive coverage of learning interests and objectives.
2. **Endless Possibilities:** Explore new areas of interest, deepen expertise, or pivot into new career paths with confidence, knowing that the extensive course selection provides limitless opportunities for personal and professional growth.

**3. Adaptive Recommendations:**

1. **Guided Learning Experience:** Benefit from guided learning experiences that adapt to individual needs, preferences, and proficiency levels, with tailored course recommendations and learning materials that evolve in real-time to optimize the learning journey.
2. **Personalized Progression:** Progress at your own pace and comfort level, with adaptive recommendations that help navigate through course content, topics, and exercises based on learning progress and mastery of concepts.

**4. Seamless Integration:**

1. **Hassle-Free Access:** Enjoy seamless access to the platform across multiple devices and environments, with intuitive interfaces and interoperable integrations ensuring effortless navigation, data synchronization, and user experience consistency.
2. **Unified Learning Ecosystem:** Seamlessly integrate the platform with existing educational tools, systems, and workflows, creating a unified learning ecosystem that streamlines administrative tasks, enhances collaboration, and maximizes resource utilization.

**Conclusion:**

The Personalized Learning Path Generator represents a paradigm shift in the field of personalized education, offering a transformative solution to the challenges of delivering tailored learning experiences. By harnessing the power of advanced algorithms, seamless integration, and user-centric design principles, our platform empowers learners, educators, and educational institutions to unlock their full potential and achieve unprecedented levels of success. With its comprehensive features, adaptive capabilities, and unparalleled benefits, our solution is poised to redefine the future of education and inspire a new era of lifelong learning.

# Risk Assessment and Mitigation Plan

**Objective:**

The primary objective of the Risk Assessment and Mitigation plan for the Personalized Learning Generator is to identify potential challenges and uncertainties in its development and implementation. This plan aims to systematically analyze and categorize risks, ensuring a comprehensive understanding of their potential impact on project timelines, budgets, and overall success. By formulating effective mitigation strategies, the goal is to minimize the likelihood and impact of identified risks, fostering a resilient project environment and ensuring successful delivery. This process will empower the project team to make informed decisions, enhance adaptability to changing circumstances, and ultimately contribute to the achievement of project goals and stakeholder expectations.

## Technical Risks:

**Integration Challenges:**
Integrating the personalized learning generator with existing learning management systems (LMS) or educational platforms may pose challenges due to differences in data formats, APIs, or system architectures.
**Likelihood**: Moderate
**Impact**: High
**Mitigation**: Conduct a detailed analysis of the integration requirements, collaborate closely with LMS providers, and use standardized APIs or middleware for seamless integration. Implement a phased integration approach, starting with less critical systems.

**Scalability and Performance:**
The system may face scalability and performance issues as the user base grows, leading to slow response times or system failures.
**Likelihood**: Moderate
**Impact:** Moderate
**Mitigation:** Design the system with scalability in mind, using scalable architecture patterns such as microservices. Conduct performance testing regularly to identify and address bottlenecks.

**Data Security and Privacy:**
Storing and processing sensitive user data, such as learning profiles and preferences, raises concerns about data security and privacy compliance.
**Likelihood:** High
**Impact:** High
**Mitigation:** Implement robust data encryption, access control, and auditing mechanisms. Ensure compliance with relevant data protection regulations, such as GDPR or CCPA.

## Resource Risks:

**Skill Set Availability:**
The project requires specialized skills in educational technology, machine learning, and user experience design, which may be scarce or in high demand.
**Likelihood:** Moderate
**Impact:** High
**Mitigation:** Identify skill gaps early and invest in training or hiring to fill them. Consider outsourcing certain tasks to specialized vendors if necessary.

**Budget Constraints:**
Unforeseen expenses or changes in project scope may lead to budget constraints, impacting the quality or completion of the project.
**Likelihood:** Moderate
**Impact:** Moderate
**Mitigation:** Regularly monitor and adjust the budget, conduct cost-benefit analyses for major decisions, and maintain a contingency fund for unexpected costs.

## Timeline Risks:

**Scope Creep:**
Description: Changes in project scope or requirements may result in delays and additional resource requirements.
**Likelihood:** High
**Impact:** High
**Mitigation:** Clearly define and document the project scope, and implement a change management process to evaluate and address any alterations. Educate stakeholders about the impact of scope changes on timelines.

**Resource Availability:**
Availability of key team members or external resources may fluctuate, impacting project timelines and deliverables.
**Likelihood:** Moderate
**Impact:** High
**Mitigation:** Cross-train team members on key skills, maintain comprehensive documentation, and foster a positive work environment to enhance employee retention. Have contingency plans for knowledge transfer.

## Financial Risks:

**Funding Uncertainty:**
Changes in funding or budget allocations may occur, leading to uncertainties in project funding.
**Likelihood:** Moderate
**Impact:** High
**Mitigation:** Diversify funding sources if possible, and maintain open communication with stakeholders regarding funding expectations and requirements.
Market Risks:

**Adoption and User Engagement:**
The personalized learning generator may face challenges in user adoption and engagement, impacting its success and viability.
**Likelihood:** Moderate
**Impact:** Moderate
**Mitigation:** Implement a robust marketing and user engagement strategy, gather user feedback for continuous improvement, and be prepared to iterate on the solution based on market response.

## Regulatory and Compliance Risks:

**Compliance with Educational Standards:**
Ensuring compliance with educational standards and regulations, such as SCORM or IMS Global, may pose challenges.
**Likelihood:** Moderate
**Impact:** High
**Mitigation:** Stay informed about updates to educational standards, collaborate with educational institutions or standards bodies, and conduct regular audits to ensure compliance.

**Risk Impact and Likelihood Matrix:**

| Risk Level | Low Likelihood | Moderate Likelihood | High Likelihood |
|---|---|---|---|
| Low Impact | Currency Exchange Fluctuations (Financial Risk) | | |
| Medium Impact | Continuous Deployment and Integration (Technical Risk) | Integration Challenges (Technical Risk), Budget Constraints (Resource Risk) | Adoption and User Engagement (Market Risk) |
| High Impact | Skill Set Availability (Resource Risk) | Data Security and Privacy (Technical Risk), Funding Uncertainty (Financial Risk) | Scope Creep (Timeline Risk), Compliance with Educational Standards (Regulatory and Compliance Risk), Resource Availability (Timeline Risk) |

## Software Solution Project Plan (WBS)

**Objective:** The objective of the Personalized Learning Path Generator project is to develop a robust and user-centric platform that offers personalized learning experiences to users. By integrating stakeholder feedback, analyzing existing educational platforms, and leveraging appropriate technologies, the project aims to create an innovative solution that meets the diverse needs of learners. Through rigorous testing, deployment planning, and continuous monitoring, the project seeks to ensure the reliability, scalability, and effectiveness of the learning path generator, ultimately empowering users to achieve their learning goals efficiently and effectively.

The Work Breakdown Structure (WBS) outlines a structured approach for the development and implementation of the Personalized Learning Path Generator project. It encompasses seven key phases, starting from project initiation and culminating in monitoring and maintenance. Each phase is meticulously planned with specific goals, deliverables, and allocated resources, ensuring a comprehensive and systematic approach towards project completion. Critical dependencies, resource allocations, timelines, and milestones are identified to facilitate smooth progress throughout the project lifecycle.

The project will follow an iterative approach, with each iteration lasting 5-7 months. Development and design tasks will be executed concurrently within each iteration to deliver incremental value. The distribution of development effort in each sprint will be as follows:

- Feature Development (50% - 60%): Emphasis on incorporating user feedback and implementing new features to enhance the Learning Path Generator's functionality and user experience.
- Bug Fixing (30% - 40%): Addressing critical issues reported by end-users to ensure the smooth operation of the Learning Path Generator.
- System Refactoring (10%): Proactive refactoring of code to maintain code quality and prevent future technical debt accumulation, thus facilitating smoother development efforts in subsequent iterations.

This allocation of effort aims to strike a balance between expanding features, resolving bugs, and maintaining code quality, ultimately optimizing the efficiency of the development and implementation process for the Learning Path Generator.

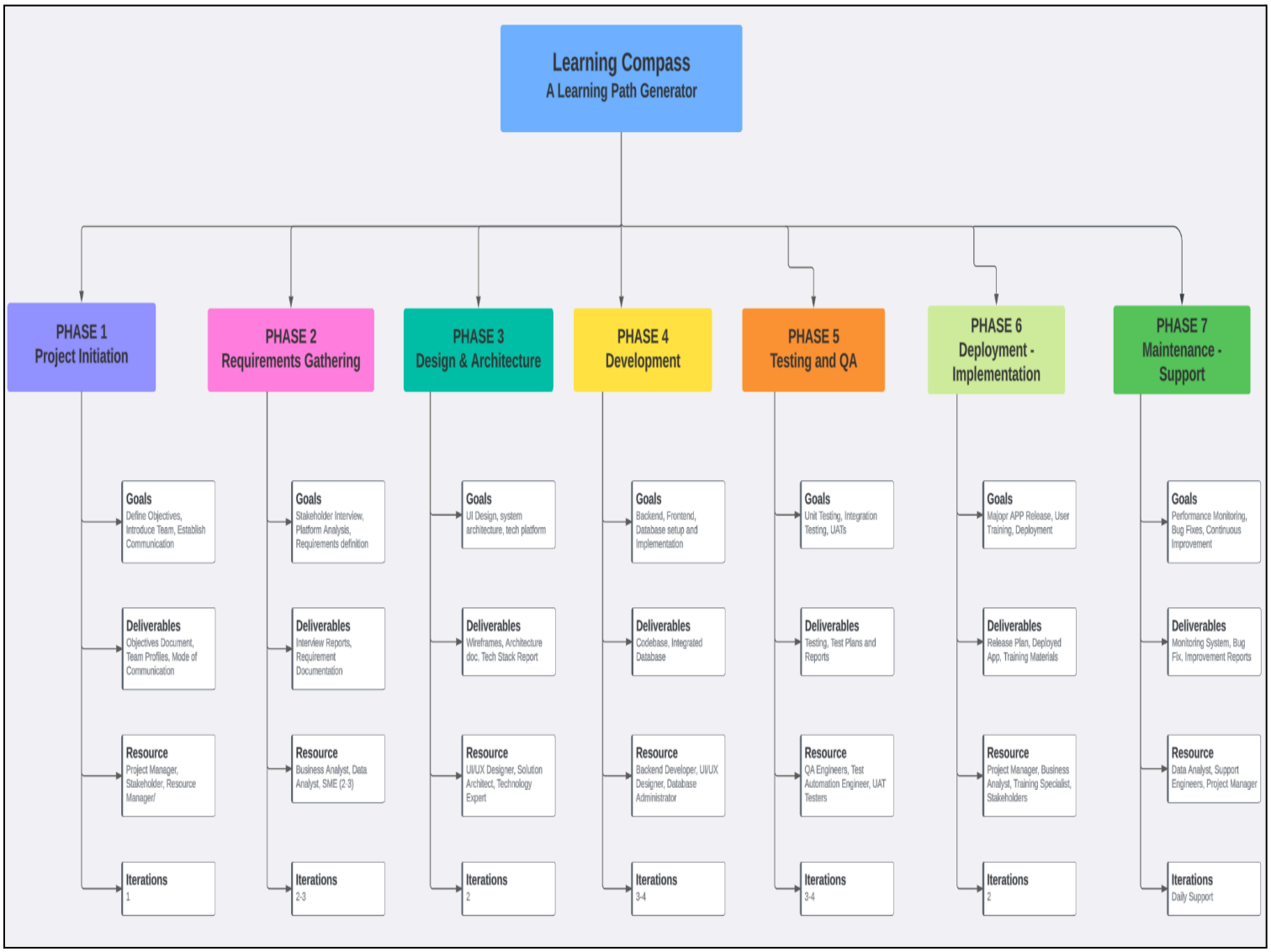
**Phase 1 - Project Initiation Phase:**

- Goals:
    - Define clear project objectives and scope to align all stakeholders.
    - Introduce project team members to foster collaboration of roles.

- Establish efficient communication channels and protocols to ensure smooth information flow.

- Deliverables:
  - Documented project objectives and scope.
  - Introduction profiles of project team members.
  - Established communication channels and protocols.

**Number of Iterations:** 1



**Phase 2 - Requirements Gathering Phase:**

- Goals:
    - Conduct comprehensive stakeholder interviews to gather diverse perspectives and requirements.
    - Analyze existing educational platforms to identify common features and potential differentiators.
    - Define clear functional and non-functional requirements to guide development.
- Deliverables:
    - Stakeholder interview reports.
    - Analysis report on existing educational platforms.
    - Documented functional and non-functional requirements.

**Number of Iterations:** 2-3

**Phase 3 - Design and Architecture Phase:**

- Goals:
    - Develop intuitive user interface designs through wireframes and mockups.
    - Design a scalable and efficient system architecture, focusing on microservices and data management.
    - Select suitable technologies for backend, frontend, and database based on project requirements.
- Deliverables:
    - User interface wireframes and mockups.
    - System architecture documentation.
    - Technology stack recommendation report.

**Number of Iterations:** 2-3

**Phase 4 - Development Phase:**

- Goals:
    - Implement backend services for user profiling, content aggregation, and recommendation engine.
    - Develop responsive and user-friendly frontend interfaces for personalized learning paths.
    - Create a robust database schema and integrate it with backend services.
- Deliverables:
    - Backend and frontend codebase.
    - Functioning database integrated with backend services.

**Number of Iterations:** Multiple

**Phase 5 - Testing and Quality Assurance Phase:**

- Goals:
    - Conduct thorough unit testing to ensure individual components function as expected.
    - Perform integration testing to validate interactions between system modules.
    - Engage stakeholders in user acceptance testing (UAT) to confirm system usability and meet requirements.
- Deliverables:
    - Unit test plans and reports.
    - Integration test plans and reports.
    - User acceptance test plans and reports.

**Number of Iterations:** 3-4

**Phase 6 - Deployment and Implementation Phase:**

- Goals:
    - Plan release milestones and deployment strategies for a smooth rollout.
    - Prepare the production environment for hosting the application.
    - Conduct user training sessions and develop documentation for seamless onboarding.
- Deliverables:
    - Release plan and deployment strategy documentation.
    - Production-ready application deployed in the environment.
    - Training materials and user guides.

**Number of Iterations:** 1-2

**Phase 7 - Monitoring and Maintenance Phase:**

- Goals:
    - Establish robust performance monitoring mechanisms to track system health and usage.
    - Address reported issues and bugs promptly to maintain system reliability.
    - Continuously gather user feedback and analytics data to identify areas for improvement.
- Deliverables:
    - Performance monitoring setup and reports.
    - Bug fixes and updates documentation.
    - Continuous improvement reports and iterations plan.

**Number of Iterations:** Support

## Resource and Task Allocation as per WBS (Table 4.1)

| Resource | Headcount & Experience | Responsibility |
|---|---|---|
| Project manager | 1 (5+ years of Project Management) | Oversees project initiation, planning, and execution. |
| Business Analyst | 1 (3+ years of Business Analysis) | Gathers and analyzes requirements, liaises with stakeholders. |
| Communication Specialist | 1 (3+ years of communication) | Establishes communication channels and protocols. |
| Research Analyst | 1 (Mid-Senior Level) | Conducts research on existing systems and methodologies. |
| User Experience Designer | 1-2 (2+ years of UX design) | Designs user interface wireframes and prototypes. |
| Subject Matter Experts | 2-3 (Varies based on domain expertise) | Provides expertise in educational methodologies. |
| Prototype Developer | 1 (2+ years of prototyping) | Develops clickable prototypes for user testing. |
| Backend Developers | 2-3 (2+ years of backend development) | Develops backend algorithms for learning path generation. |
| Frontend Developers | 2-3 (2+ years of frontend development) | Implements frontend interfaces based on designs. |
| Database Administrator | 1-2 (2+ years of database management) | Manages integration of database for user preferences. |
| QA Engineers | 2-3 (2+ years of QA testing) | Conducts unit testing and ensures quality assurance. |
| Test Automation Engineers | 1-2 (2+ years of test automation) | Implements automated testing processes. |
| Beta Testers | 2-3 (Varies based on availability) | Engages in beta testing and provides feedback. |
| Deployment Manager | 1 (3+ years of deployment management) | Plans deployment strategy and release milestones. |
| System Administrators | 2-3 (2+ years of system administration) | Manages deployment and production environment. |
| Training Specialist | 1-2 (2+ years of training) | Provides user training and support materials. |
| Product Manager | 1 (5+ years of product management) | Oversees monitoring, |

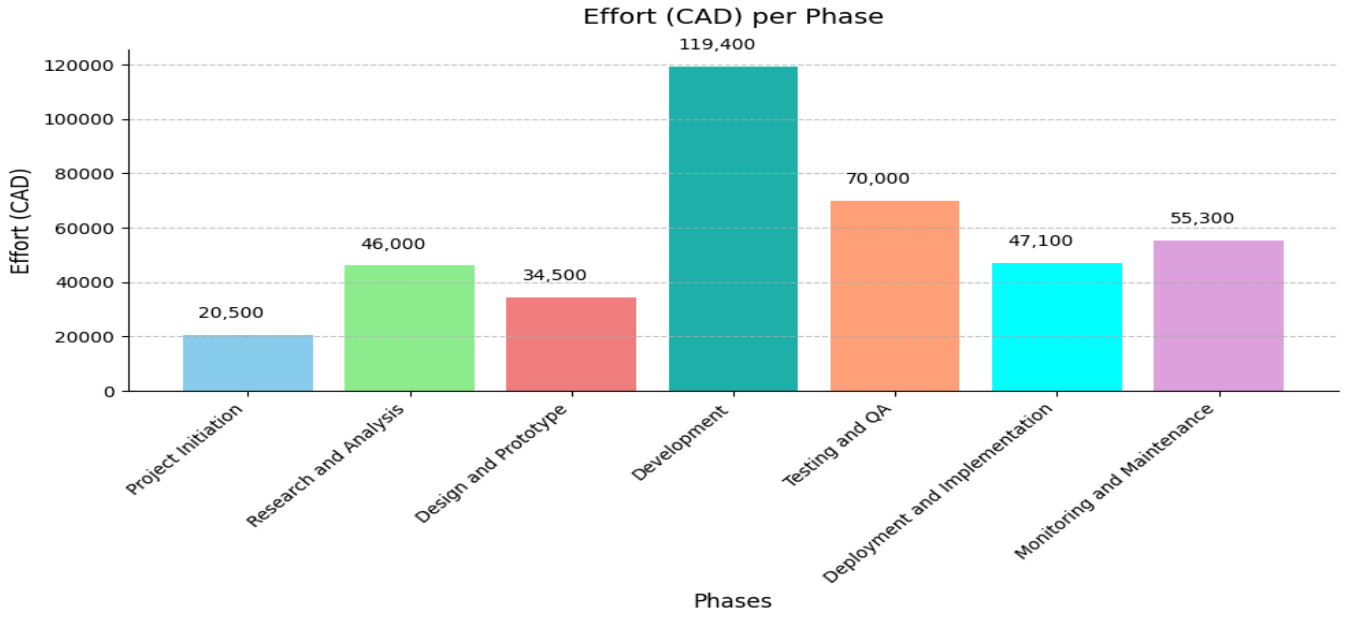
| Resource | Headcount & Experience | Responsibility |
|---|---|---|
| Project manager | 1 (5+ years of Project Management) | Oversees project initiation, planning, and execution. |
| Business Analyst | 1 (3+ years of Business Analysis) | Gathers and analyzes requirements, liaises with stakeholders. |
| Communication Specialist | 1 (3+ years of communication) | Establishes communication channels and protocols. |
| Research Analyst | 1 (Mid-Senior Level) | Conducts research on existing systems and methodologies. |
| User Experience Designer | 1-2 (2+ years of UX design) | Designs user interface wireframes and prototypes. |
| Subject Matter Experts | 2-3 (Varies based on domain expertise) | Provides expertise in educational methodologies. |
| | | maintenance, product support. |

## Budgeting

## Effort Estimate for each phase per resource (Table 5.1)

| | | | | Phase 1 | | Phase 2 | | Phase 3 | | Phase 4 | | Phase 5 | | Phase 6 | | Phase 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Team | Resource | Total Person | Per Month Salary | Man Months | Effort | Man Months | Effort | Man Months | Effort | Man Months | Effort | Man Months | Effort | Man Months | Effort | Man Months | Effort |
| Planning & management Team | Project Manager | 1 | $8,000.00 | 1 | $8,000.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| | Business Analyst | 1 | $6,000.00 | 1 | $6,000.00 | 2 | $12,000.00 | - | - | - | - | - | - | - | - | 1 | $6,000.00 |
| | Communication Specialist | 1 | $6,500.00 | 1 | $6,500.00 | - | - | - | - | - | - | - | - | - | - | - | - |
| | Research Analyst | 1 | $6,000.00 | - | - | 1 | $6,000.00 | - | - | - | - | - | - | - | - | - | - |
| | User Experience Designer | 2 | $7,000.00 | - | - | - | - | 2 | $28,000.00 | - | - | - | - | - | - | - | - |
| | Subject Manager Expert | 2 | $7,000.00 | - | - | 2 | $28,000.00 | - | - | - | - | - | - | - | - | - | - |
| | Product Manager | 1 | $8,000.00 | - | - | - | - | - | - | - | - | - | - | - | - | 1 | $8,000.00 |
| | **Total for PM Team** | 9 | | | | | | | | | | | | | | | |
| Development Team | Backend Developer | 2 | $7,000.00 | - | - | - | - | - | - | 4 | $56,000.00 | - | - | - | - | - | - |
| | Frontend Developer | 2 | $6,300.00 | - | - | - | - | - | - | 4 | $50,400.00 | - | - | - | - | 1 | $7,000.00 |
| | Database Administrator | 1 | $6,500.00 | - | - | - | - | - | - | 2 | $13,000.00 | - | - | - | - | 1 | $6,300.00 |
| | Prototype Developer | 1 | $6,500.00 | - | - | - | - | 1 | $6,500.00 | - | - | - | - | - | - | - | - |
| | **Tottal for Dev Team** | 6 | | | | | | | | | | | | | | | |
| QA & Testing Team | QA Engineer | 2 | $6,500.00 | - | - | - | - | - | - | - | - | 3 | $39,000.00 | - | - | - | - |
| | Test Automation Engineer | 1 | $6,500.00 | - | - | - | - | - | - | - | - | 2 | $13,000.00 | - | - | - | - |
| | Beta Tester | 1 | $6,000.00 | - | - | - | - | - | - | - | - | 3 | $18,000.00 | - | - | - | - |
| | **Total for QA Team** | 4 | | | | | | | | | | | | | | | |
| Support Team | System Administrator | 2 | $7,000.00 | - | - | - | - | - | - | - | - | - | - | 2 | $28,000.00 | 2 | $28,000.00 |
| Implementation Team | Deployment Manager | 1 | $7,100.00 | - | - | - | - | - | - | - | - | - | - | 1 | $7,100.00 | - | - |
| | Training Specialist | 2 | $6,000.00 | - | - | - | - | - | - | - | - | - | - | 1 | $12,000.00 | - | - |
| | **Total for Support Team** | 5 | | | | | | | | | | | | | | | |
| | **Total Effort for each Phase** | | | | **$20,500.00** | | **$46,000.00** | | **$34,500.00** | | **$119,400.00** | | **$70,000.00** | | **$47,100.00** | | **$55,300.00** |

**Note: Effort and Cost = No. of Persons * Man-Months * Monthly Salary**



From the above chart, we could see that the Development Phase and the Testing phase require the maximum effort and man-months. These phases include crucial activities from development of the software to creating working applications. The reasons can be as follows:

**Development Phase:**

Effort: 119,400 CAD

- The Development Phase typically requires a significant amount of effort and resources due to the implementation of various features and functionalities outlined in the requirements.
- This phase involves the work of backend and frontend developers, database administrators, and potentially other specialists to build the core infrastructure and user interfaces of the Learning Path Generator.
- Tasks such as coding, testing, debugging, and integration of different components contribute to the high effort required in this phase.
- The complexity of the development tasks, such as implementing personalized learning algorithms, content aggregation, and recommendation engines, can further increase the effort required.
- Continuous collaboration and coordination among team members are crucial during this phase to ensure the successful implementation of the project requirements.

**Testing and QA Phase:**

Effort: 70,000 CAD

- The Testing and QA Phase is essential for ensuring the quality and reliability of the Learning Path Generator. This phase involves various activities such as unit testing, integration testing, system testing, and user acceptance testing (UAT) to identify and address any defects or issues in the system.
- QA Engineers and Test Automation Engineers play a critical role in developing test plans, executing tests, and automating repetitive testing tasks.
- Beta testing with real users helps gather valuable feedback and identify usability issues, which requires additional effort and resources.
- Ensuring compatibility across different devices, browsers, and operating systems adds complexity to the testing process and may contribute to the higher effort required.
- Thorough testing is crucial to delivering a high-quality product that meets user expectations and minimizes the risk of post-deployment issues or failures.

These phases, Development and Testing and QA, are critical stages in the Learning Path Generator project, requiring significant effort and resources to ensure the successful implementation and quality assurance of the system. Allocating adequate time and resources to these phases is essential for the overall success of the project.

## Yearly Effort Estimation

| Team | Resource | Total Person | Per Month Salary | Per Year Cost | Total Cost |
|---|---|---|---|---|---|
| Planning & management Team | Project Manager | 1 | $8,000.00 | $96,000.00 | $96,000.00 |
| | Business Analyst | 1 | $6,000.00 | $72,000.00 | $72,000.00 |
| | Communication Specialist | 1 | $6,500.00 | $78,000.00 | $78,000.00 |
| | Research Analyst | 1 | $6,000.00 | $72,000.00 | $72,000.00 |
| | User Experience Designer | 2 | $7,000.00 | $84,000.00 | $168,000.00 |
| | Subject Manager Expert | 2 | $7,000.00 | $84,000.00 | $168,000.00 |
| | Product Manager | 1 | $8,000.00 | $96,000.00 | $96,000.00 |
| | **Total for PM Team** | **9** | - | - | **$750,000.00** |
| Development Team | Backend Developer | 2 | $7,000.00 | $84,000.00 | $168,000.00 |
| | Frontend Developer | 2 | $6,300.00 | $75,600.00 | $151,200.00 |
| | Database Administrator | 1 | $6,500.00 | $78,000.00 | $78,000.00 |
| | Prototype Developer | 1 | $6,500.00 | $78,000.00 | $78,000.00 |
| | **Tottal for Dev Team** | **6** | | | **$475,200.00** |
| QA & Testing Team | QA Engineer | 2 | $6,500.00 | $78,000.00 | $156,000.00 |
| | Test Automation Engineer | 1 | $6,500.00 | $78,000.00 | $78,000.00 |
| | Beta Tester | 1 | $6,000.00 | $72,000.00 | $72,000.00 |
| | **Total for QA Team** | **4** | | | **$306,000.00** |
| Support Team | System Administrator | 2 | $7,000.00 | $84,000.00 | $168,000.00 |
| Implementation Team | Deployment Manager | 1 | $7,100.00 | $85,200.00 | $85,200.00 |
| | Training Specialist | 2 | $6,000.00 | $72,000.00 | $144,000.00 |
| | **Total for Support Team** | **5** | | | **$397,200.00** |
| | **Total Yearly Effort (CAD)** | | | | **$1,928,400.00** |

## Total Budget Calculation

**TOTAL BUDGET: $ 2,100,000.00**
This includes all expenses related to the development, testing, deployment, and maintenance of the Learning Path Generator application.

**Office Expenses:** 15% of Total Budget (This includes server costs, office equipment and software costs, sustainability plans, etc.)
These expenses cover the costs associated with maintaining office space, utilities, equipment, and other overhead expenses necessary for running the project.

Calculation of Office Expenses = $ 2,100,000.00 * 0.15 = **$ 315,000.00**

**Miscellaneous Expenses:** 3% of Total Budget.
These are additional expenses that may arise during the project, such as travel expenses, software licenses, training, marketing, and other unforeseen costs.

Calculation of Misc. Expenses = $ 2,100,000.00 * 0.03 = **$ 63,000.00**

**Contingency:** 10% of Total Budget.
Contingency funds are set aside to cover unexpected expenses or risks that may arise during the project. It is typically a percentage of the total budget allocated as a buffer to mitigate risks.

Calculation of Contingency = $ 2,100,000.00 * 0.10 = **$ 210,000.00**

**Total Cost including Contingency:** Total Budget+Office Expense+Misc. Expense+Contingency
This is the total estimated cost of the project, including both planned expenses and contingency funds to account for uncertainties.

Calculation = **$ 2,100,000.00 + $ 315,000.00 + $ 63,000.00 + $ 210,000.00 = $ 2,688,000.00**

**Below is the table representation of the Budget**

| Type of Expense | Amount (CAD) | Remarks |
|---|---|---|
| Total Budget | $2,100,000.00 | |
| Office Expense | $315,000.00 | 15% of Total Budget |
| Miscellaneous Expense | $63,000.00 | 3% of Total Budget |
| Contingency | $210,000.00 | 10% of Total Budget |
| Total Cost | $2,688,000.00 | Sum of all Expenses |

## References:


1. https://journals.sagepub.com/doi/abs/10.1177/875697280103200103
2. https://asana.com/resources/project-charter
3. https://thedigitalprojectmanager.com/projects/scope-management/project-charter/
4. https://www.planttext.com/
5. https://www.bathtownshippublicliblrary.org/site-assets/images/logos/linkedin-in-learning-logo.png/image_view_fullscreen
6. https://en.m.wikipedia.org/wiki/File:Khan_Academy_logo_%282018%29.svg
7. https://en.wikipedia.org/wiki/Coursera
8. https://lucid.app/lucidspark/2ba434e8-7f9a-4e70-aec7-e2997d17d8f9/edit?beaconFlowId=DF2A75BFE3487D40&invitationId=inv_cdd6987d-d455-4718-8832-1bfd9bd56e6c&page=0_0#