

Learning Path Dashboard for Enhancing Skills

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Abstract: In today's fast-changing educational and professional environment, having the right skills is very important for students and job seekers. However, many learners find it difficult to understand which skills they already have, which skills they need to improve, and what resources they should use for learning. This research presents a Learning Path Dashboard for Enhancing Skills, which is designed to help learners understand their current skills and plan their learning journey in a simple and organized way. The proposed dashboard provides a personalized learning path based on a learner's existing skills, interests, career goals, and skill gaps. It uses data visualization to display information such as skill levels, completed courses, learning progress, recommended skills, and career-related learning paths. Tools such as Python, SQL, and Power BI can be used to analyze the data and create interactive visualizations. The dashboard allows learners to track their progress, identify areas where improvement is needed, and decide what they should learn next. By providing learning information in a clear and visual format, the proposed system can make the learning process more organized and easier to follow. Overall, the Learning Path Dashboard can support students and job seekers in improving their skills and working toward their academic and career goals.

I. INTRODUCTION

In today's changing world, having the right skills is important for academic, professional, and personal growth. Students and job seekers need to regularly improve their technical and soft skills to meet the changing needs of the industry. However, many learners are not sure about the skills they already have, the skills they need to improve, or which learning resources are suitable for their career goals. Learning through different platforms without a proper plan can also make the learning process confusing and difficult to manage. Therefore, there is a need for a simple and user-friendly system that can help learners understand their skill gaps and choose a suitable learning path. The Learning Path Dashboard for Enhancing Skills is a data-driven solution designed to help learners plan, monitor, and improve their skills. The dashboard can collect and display information such as current skill levels, completed courses, learning progress, target skills, recommended courses, and career-related requirements. With the help of charts, graphs, and other visualizations, learners can easily understand their progress and identify the areas where they need more improvement. Technologies such as Python, SQL, data analysis, and Power BI can be used to process learning data and present useful information through interactive visualizations. The main reason for selecting this topic is the growing importance of skill development and the difficulty many learners face when deciding what to learn next. A properly designed learning path can reduce this confusion and give learners a clear direction based on their interests, existing knowledge, and career goals. It can also encourage learners to continue their learning by showing their progress and achievements. The scope of this research is to design a dashboard that provides a clear and organized view of a learner's skills and learning activities. The system can be useful for students, job seekers, educational institutions, and training organizations. The main objectives are to identify skill gaps, track learning progress, recommend suitable skills or learning resources, and provide visual information that can help learners make better learning decisions. The main objective of this research is to develop a Learning Path Dashboard that helps learners identify their skill gaps, monitor their learning progress, and follow a suitable learning path to improve their skills and achieve their academic and career goals.

II. LITERATURE SURVEY

Several researchers have worked on learning dashboards, personalized learning, and systems that recommend suitable learning paths. Their studies provide a useful foundation for developing a Learning Path Dashboard for Enhancing Skills.

Verbert et al. studied learning dashboards and found that visual dashboards can help learners understand their learning activities and track their progress more easily. However, they also observed that many existing dashboards were still in the experimental stage and required further evaluation. [1]

Bodily and Verbert reviewed student-facing learning dashboards and educational recommendation systems. Their study showed that dashboards can provide useful information and learning recommendations. At the same time, they highlighted the need to give more attention to learners' actual requirements and to improve dashboard design. [2]

Matcha et al. examined learning dashboards from the perspective of self-regulated learning. Their study found that many dashboards mainly focus on displaying information about learners, but they provide limited guidance about what learners should do next. [3]

Nabizadeh et al. reviewed different methods for personalized learning path recommendations. Their research showed that learning paths can be adapted according to a learner's skills, goals, background, and learning needs. This supports the use of personalized recommendations to guide learners. [4]

Rahayu et al. studied learning path recommendation systems and found that information about learners, their learning activities, and available learning resources can be used to create suitable learning sequences. However, they also noted that further research and practical implementation are needed in this area. [5]

Banihashem et al. examined learning analytics and feedback systems. Their study emphasized that simply presenting data is not enough; meaningful visualizations and useful feedback are also important for helping learners understand their progress and improve their learning. [6]

Ifenthaler and Yau studied the use of learning analytics in higher education. Their research showed that learning analytics can help identify learners' difficulties and support better learning decisions. They also emphasized the importance of providing personalized support instead of only displaying learning data. [7]

Recent studies on AI-based personalized learning have also shown that adaptive technologies can create learning paths according to the individual needs of learners. However, many existing systems mainly focus on academic learning and do not completely combine skill-gap analysis, progress tracking, career goals, and learning recommendations in one system. [4], [5], [9]

Therefore, the existing research provides a strong foundation for developing a Learning Path Dashboard that combines these features and helps learners understand their current skills, identify areas for improvement, track their progress, and follow a suitable learning path. [1]–[7]

Research Gap

The literature shows that existing systems mainly focus on learning analytics, dashboards, or recommendation systems separately. Only a few systems bring these features together in a single, simple, and interactive platform. This creates a gap in providing learners with one system that can help them understand their skills, identify areas where they need improvement, track their learning progress, and receive suitable recommendations. [1]–[7]

To address this gap, the proposed Learning Path Dashboard for Enhancing Skills combines skill assessment, skill-gap identification, progress tracking, personalized recommendations, and data visualization. The aim is to provide learners with a clear and organized way to choose and follow a learning path that matches their skills and goals.

III.METHODOLOGY

1.Research Design

This study uses a descriptive and quantitative research approach. The main focus is to understand learners' skill levels, learning needs, progress, and career goals. The collected information is analyzed to find skill gaps and develop suitable learning paths for learners. [3], [7]

2.Data Collection Methods

Both primary and secondary data are considered in this study. Primary data can be collected from students and learners through questionnaires or surveys. Secondary data is gathered from research papers, online learning platforms, existing datasets, and other reliable sources related to skills, learning, and career development. [6], [7]

3.Research Tools and Instruments

A structured questionnaire is used to collect information about learners' skills, interests, completed courses, career goals, and areas where they need improvement. Python, SQL, and Power BI are used to process and analyze the collected data and to develop the learning dashboard. [1], [2], [6]

4. Sampling Procedure

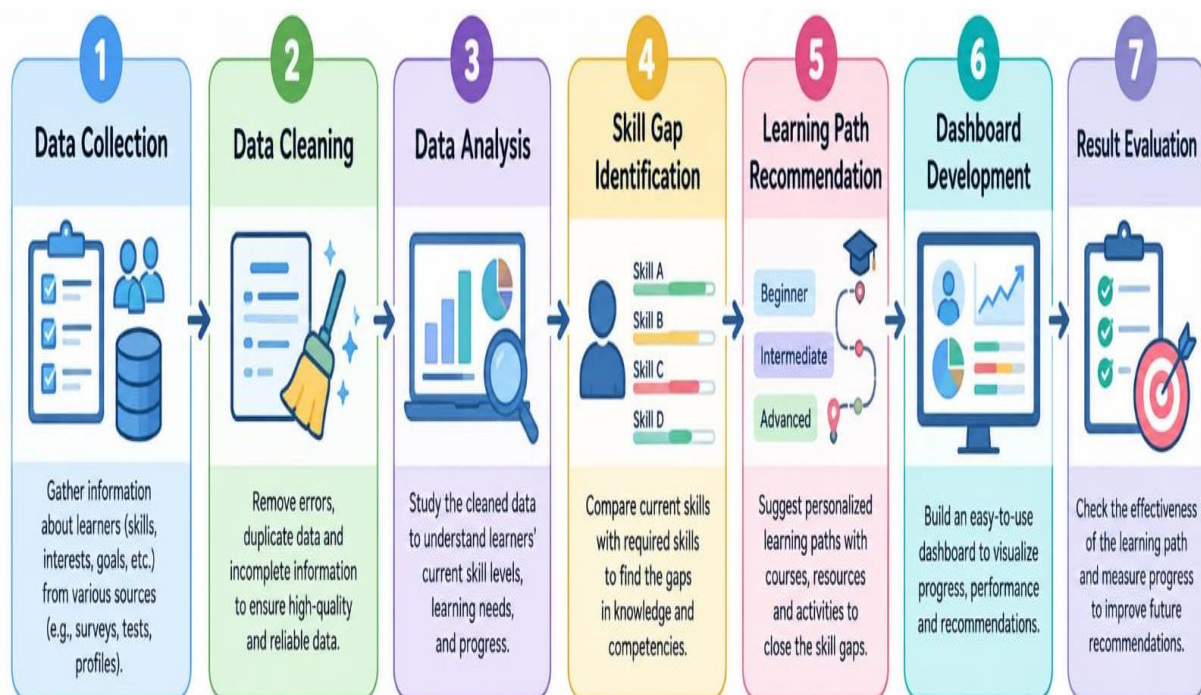
The target population mainly includes students and learners who are interested in improving their skills. A suitable group of learners can be selected using convenience or purposive sampling, depending on the availability and accessibility of participants. The collected responses are then used to understand common skill gaps and learning needs. [3], [4], [5]

5. Data Analysis Techniques

The collected data is first cleaned and then analyzed using Python and SQL. Descriptive statistics, such as percentages, averages, and comparisons, are used to understand learners' skill levels, skill gaps, and learning progress. Power BI is used to create interactive charts and dashboards that display skill levels, progress, recommendations, and suggested learning paths. [3], [6], [7]

IV. PROPOSED WORKFLOW

The proposed methodology follows a step-by-step process for developing the Learning Path Dashboard. The system collects information about learners' skills, interests, learning activities, and career goals. The data is then processed and analyzed to identify skill gaps and learning requirements. Based on the analysis, suitable learning recommendations and paths are presented through an interactive dashboard. This approach helps learners understand their current skills, identify areas that need improvement, monitor their progress, and follow an appropriate learning path. [1]–[7]



V.RESULTS

The developed Learning Path Dashboard for Enhancing Skills presents information about learners' skill levels, learning progress, skill gaps, and recommended areas for further learning. The results are organized according to the main objectives of the study. The dashboard provides learners with a clear and organized view of their current skills and helps them understand the areas where further improvement may be required.

1.Skill Level Analysis

The collected data shows that learners have different levels of skills in areas such as Python, SQL, Power BI, communication, and problem-solving. Based on their skill levels, the dashboard groups learners into three categories: beginner, intermediate, and advanced.

Table 1: Skill Level Distribution

Skill	Beginner	Intermediate	Advanced
Python	40%	45%	15%
SQL	35%	50%	15%
Power BI	50%	40%	10%
Communication	30%	50%	20%

2.Skill Gap Identification

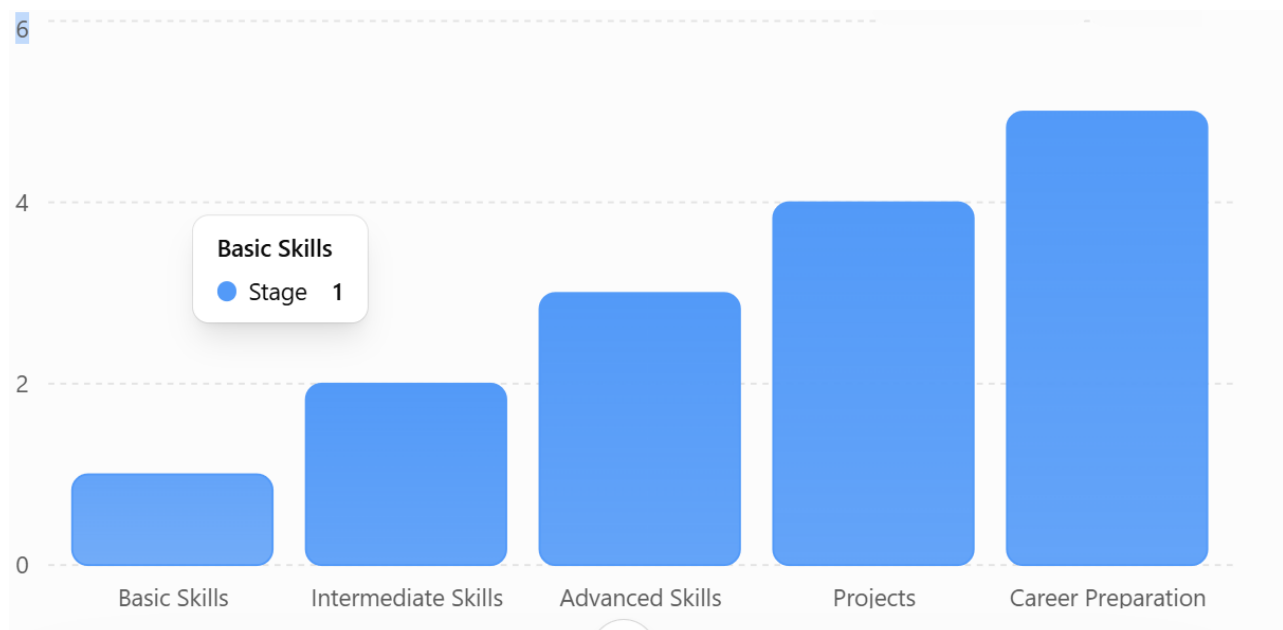
The dashboard helps identify the areas where learners need further improvement. The results show that technical skills such as Power BI and advanced programming require more attention compared with basic skills that learners have already completed.

3.Learning Progress

The dashboard tracks learners' course completion and overall learning progress. Progress is shown using percentage indicators and charts. This makes it easier to record and understand which learning activities are completed, ongoing, or pending.

4.Recommended Learning Path

The dashboard provides learning recommendations based on learners' existing skills and identified skill gaps. The suggested learning path follows a step-by-step approach:



This helps learners understand what they can focus on at each stage of their learning journey.

5.Overall Dashboard Results

The dashboard presents learners' skill levels, skill gaps, learning progress, and recommended learning paths in an interactive format. It provides a clear and organized view of learners' current skills and the areas they can focus on for further development.

VI.DISCUSSION

The results show that the Learning Path Dashboard for Enhancing Skills can give learners a clear understanding of their current skills, learning progress, skill gaps, and areas that need further improvement. By presenting this information through interactive charts and visualizations, the dashboard makes it easier for learners to organize their learning activities and follow a structured path for skill development.

These findings are in line with the work of Verbert et al., who found that learning dashboards can help learners understand their learning activities and progress through visual representations. Similarly, Bodily and Verbert highlighted the importance of learner-focused dashboards and educational recommendations. The proposed system brings these ideas together by providing both learning progress information and recommended learning paths.

The findings also support the work of Nabizadeh et al., which showed that personalized learning paths can be created based on learners' skills, goals, and learning needs. In the proposed system, skill-gap identification is used to understand which areas require further development. The results are also related to the work of Matcha et al., who emphasized that learning dashboards should provide useful support to learners instead of only displaying information.

Implications and Significance

The proposed dashboard can help students and job seekers understand which skills they need to improve and choose suitable learning activities. Educational institutions and training organizations may also use similar dashboards to monitor learner progress and provide more personalized guidance.

The use of Python, SQL, and Power BI supports the practical analysis and visualization of learning data. By bringing skill information, progress tracking, and learning recommendations together, the dashboard can provide learners with a more organized view of their skill development.

Limitations

This study has some limitations. The results depend on the quality and accuracy of the data provided by learners. If the collected information is incomplete or inaccurate, it may affect the analysis and recommendations.

The sample size may also be limited, which can affect how widely the findings can be applied to other groups of learners. In addition, the current system mainly provides recommendations based on available skill and learning data. It does not fully consider detailed individual learning behavior or other personal learning factors.

Future Scope

In the future, the dashboard can be improved by using Artificial Intelligence (AI) and Machine Learning (ML) to provide more personalized learning recommendations based on individual learners' skills and needs. The system can also be extended to include real-time tracking of learning progress and more career-related skill information.

Using larger datasets can help improve the analysis and recommendations provided by the dashboard. The system can also be connected with online learning platforms so that learners can access suitable courses and learning resources more easily.

Overall, the Learning Path Dashboard has the potential to make learning more organized by helping learners identify their skill gaps, track their progress, choose suitable learning activities, and work toward their career-related skill goals.

VII. CONCLUSION

The study concludes that the Learning Path Dashboard for Enhancing Skills can be a useful way to help learners improve their skills. The dashboard brings important information such as current skill levels, skill gaps, learning progress, and recommended learning areas together in one interactive platform. Using tools such as Python, SQL, and Power BI makes it easier to analyze, visualize, and understand learning-related information. The results show that the dashboard can help learners identify the areas where they need improvement, keep track of their learning activities, and follow a structured learning path based on their goals. It can also help students and job seekers understand which skills they need to develop for their academic and career growth.

In the future, the system can be improved by using Artificial Intelligence (AI) and Machine Learning (ML) to provide more personalized learning recommendations. Features such as real-time progress tracking, career-based skill recommendations, integration with online learning platforms, and larger datasets can further improve the system. Overall, the Learning Path Dashboard provides a practical and data-driven approach to skill development, progress tracking, and personalized learning. It can help modern learners organize their learning activities and work toward their academic and career-related goals.

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