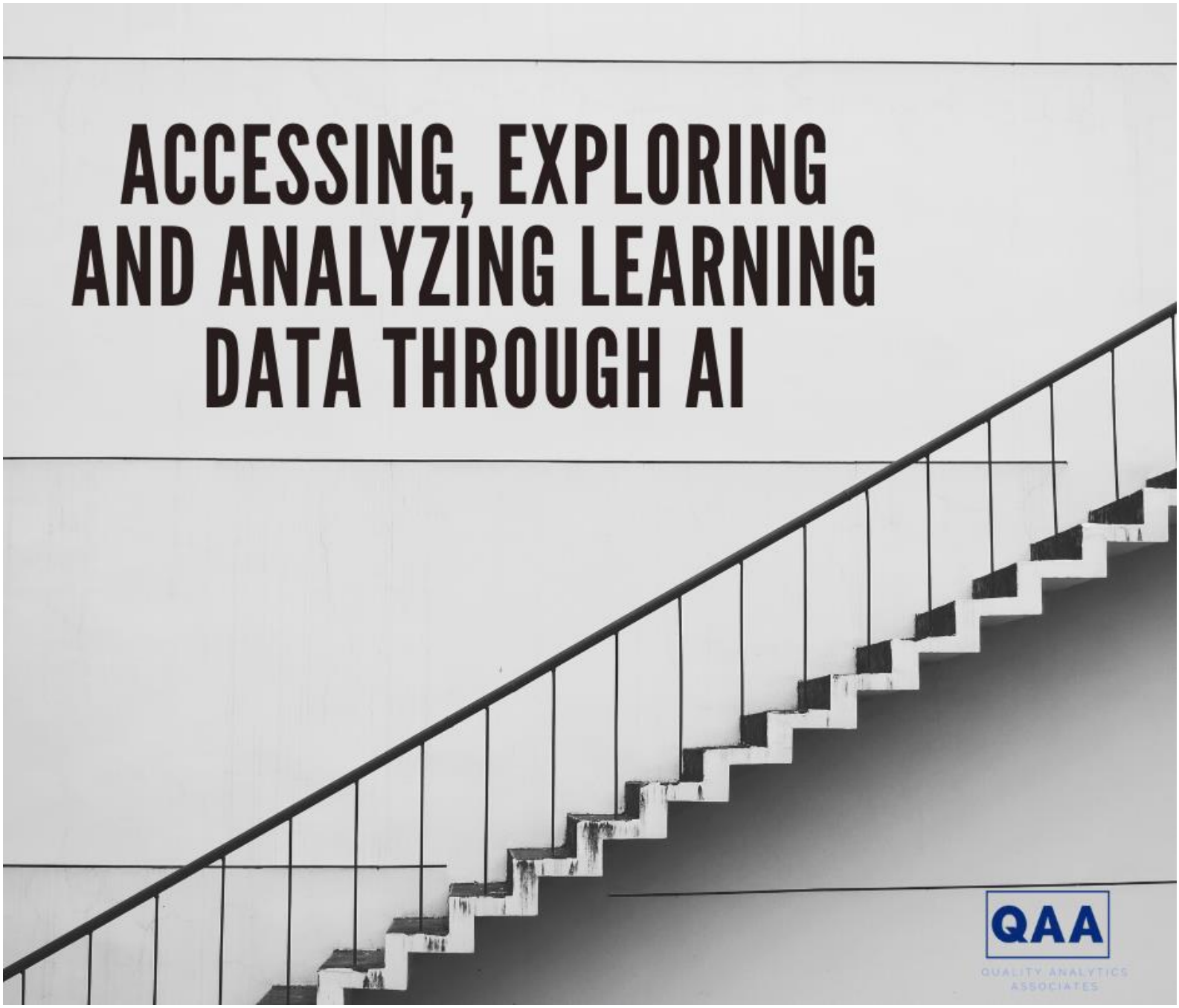

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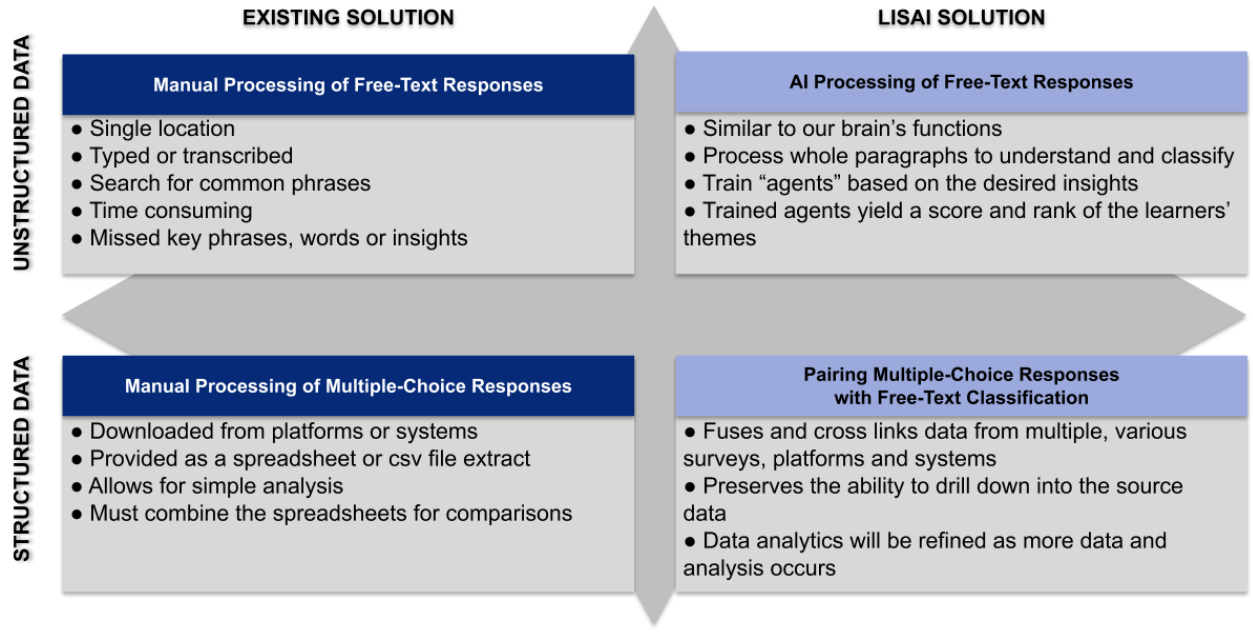
Executive Summary

Quality Analytics Associates (QAA) provides administrators and educators with the ability to access, explore, summarize, analyze and interact with data through our customizable Learning Integrated System AI (LISAI) dashboard system. LISAI focuses on determining reliable, relevant and unbiased data insights concerning a designated educational program.

LISAI offers these capabilities through the development of an artificial intelligence system with an adaptable dashboard that integrates assessment data from multiple "structured" and "unstructured" sources while using algorithms to provide insights to educators and administrators to determine the return on investment (ROI) and unknown insights from programs.

How can QAA's team make these capabilities available? By collaborating with educational programs and asking questions to determine what themes or insights the required targets for the textual data are and use this information to build topic agents for the text analytics. Other considerations include:

- Single interface or dashboard ability to view data.
- Interactive dashboards built to specific needs.
- Data extracted and appended within designated entities and sentiments (dashboard areas).
- Supplement with an open intelligence for context.
- Provide domain specific core concepts and themes using our AI technology.
- Provide as a service through cloud or on-premise application



Introduction

According to the Department of Education, US students include a wide diversity of data management which comprises learners who have disabilities (16%), online course offerings (55%), varying state assessment standards, behavioral programs, etc. Administrators and teachers need to track more than assessments, which often contain more than scores to understand learners' strengths and weaknesses. A complete AI system should involve written comments, explanations, instructor ratings and, in some cases, reference materials. These combined provide the necessary information for administrators and educators to understand if a program met the requirements necessary to assist students in meeting and exceeding learning outcomes.

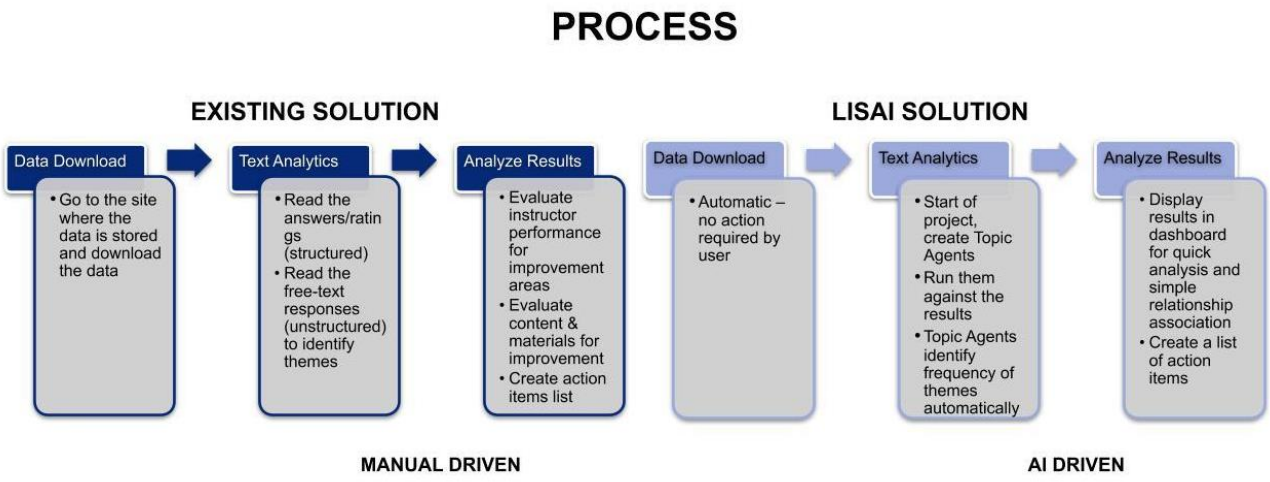
Unfortunately, a system does not exist that can combine verbal and numerical educational data for analysis into one dashboard location. As a solution, QAA provides an artificial intelligence system with a customizable dashboard that integrates educational data from multiple "structured" and "unstructured" sources while using algorithms to provide insights to educators and administrators to determine the return on investment (ROI) and unknown insights from programs.

Quality Analytics Associates' (QAA) and Bintel, Inc (BEI) have teamed up to provide an analytics system known as the Learning Analytics System AI (LISAI) to assist administrators and educators who are overwhelmed with tasks necessary to move beyond the minimal requirements for focusing on individual improvements as well as way to sort and search for curriculum or relevant educational documents. A complete individual learner view for administrators and educators requires the gathering of "unstructured" and "structured" data in one location before most manual analysis begins. If group or whole institutional comparison is desired, the data must be manually prepared before beginning the analysis. Honestly, educators do not have time to perform adequate or deep analysis of individuals, group or institutional analysis to determine unknown insights or search for data point patterns.

Our new system improves an institution's learning environment by delivering organization, group and individual analysis with insights at designated administrators and educators' fingertips. These details allow educators to improve personal performance, students' performance and lead to overall achievement of improved institution performance. In addition, our team has the ability to provide a personal library of curriculum and documents for institutions that can be sorted and searched as part of the dashboard. This personalized library offers the administrators and educators' tools to assist in improving after identifying strengths and weaknesses

What Makes LISAI Better?

Although we use AI to gather and analyze limited data within learning management systems (LMS), administrators and educators could benefit from AI further if we fused the data from the LMS to other data collected leading to deeper insights. To compare data from LMS and other systems, currently, institutions must spend time and resources manually gathering and preparing data before analysis occurs. LISAI reduces the impact to institutions by gathering all unstructured and structured data into



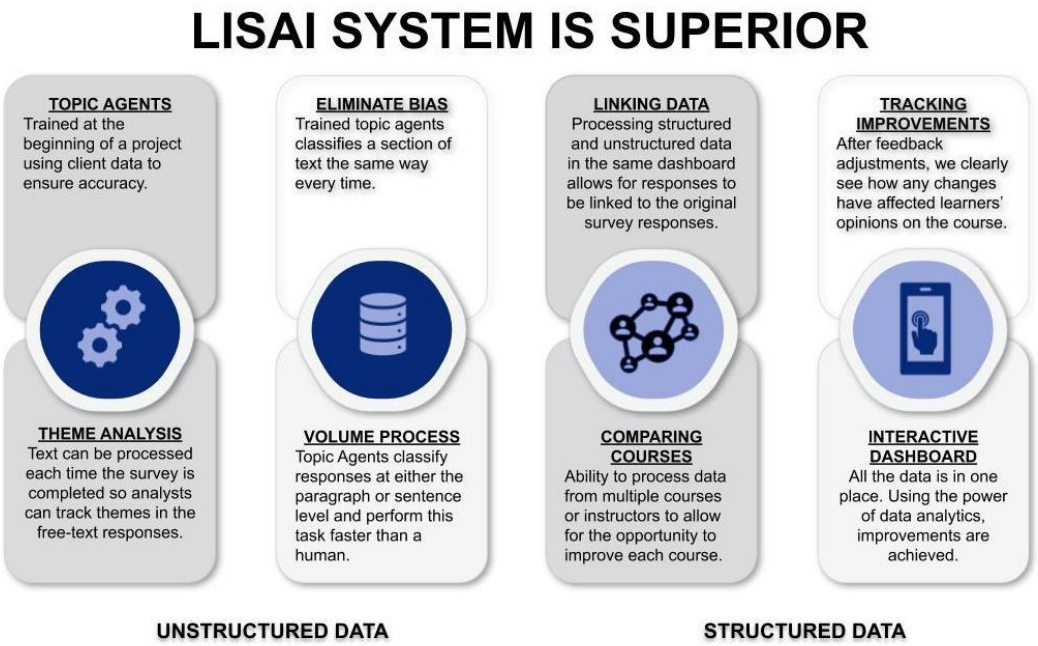
one dashboard while simultaneously performing the qualitative and/or quantitative analysis. This leads to the discovery of missed conclusions and data points.

As noted in our process visual, by taking AI topic agents and data analytics, the LISAI allows education teams to decipher the data collected and determine actionable steps for the programs, institutions and individual instructors or students. There are a few key components included in LISAI to differentiate from existing systems:

- Content Library
    - Program and/or institutional internal libraries (i.e. curriculum materials, assessment materials and/or surveys, standard operating procedures, handbooks, job specific documentation, etc.). The ability to easily navigate the archives and supplement any learning by using the topic agents to find more information.
    - Audio files may be transcribed (including recordings of learning sessions) and added to this library as a search option.
    - Open source materials such as news articles, PDFs, presentations and libraries can also be added to the library.
- Learner Feedback
    - The full value in the feedback surveys given after a course is not often used. Giving programs, institutions and instructors the power of AI topic agents assigned to track themes and sentiment in learner feedback would have a positive impact in two big ways:

- At the instructor level: Instructors can modify their course content and methodology to ensure the best experience for their learners and track whether learners like the improvements.
- At the program and institutional level: Data will be available for all the instructors. Who is performing best? With the data demonstrating, why the instructor(s) are performing well? This data can be used to help pinpoint what learners are looking for in their courses while providing an opportunity to share good techniques to ensure performance and learner experience is positive.

Programs and institutions have all this data available in a dashboard, with visualizations showing the scores, sentiment and topics discussed in free text responses over time. Depending on needs and requirements, some customizations can be added to answer other specific learning or program questions (i.e. graduation rate, retention, etc.). Integrating all these features to gain complete 360 learning metrics requires a technical challenge that can be overcome by our team, but the reward for programs leads to better instructors, learning and overall, strategically better institutions.



Data Leading to Potential Insights

As program and course teams prepare for analysis, they consider the most pertinent learning questions needing the quick solutions. That is, the learning and course questions the team most often are asked by students and place these at the top of the list in the search for answers. How can LISAI assist with this issue?

When considering the questions and answers, the institution's team knows that a single program is not sophisticated enough to discover nuanced answers or insights if questions are misinterpreted (i.e. simple, short questions and answers are best).

After looking through the data, the institution attempts to answer questions and determine missed insights from previous terms. Potential questions for consideration include:

- Did the modality influence the retention/assessment score?
- Did the learners who attended a specific instructor's course maintain a higher GPA?

- Did the program provide a higher retention or higher job hiring rate for learners who completed versus those who completed at another institution?

LISAI System Requirements

The LISAI system leverages Tableau BI and other visualization platforms and integrates directly with multiple survey data programs. This gives our team the ability to customize a dashboard that complies with any organization's learner analytics requirements while meeting multiple objectives in order to provide an overall training value and metric solution.

Setting-Up the LISAI System

Our team provides LISAI either as a cloud-based or containerized software application running on private networks or single PCs. Therefore, organizations require only one of the following hardware solutions:

1. a single PC for use as a terminal for a web application running on a cloud solution, or
2. a container-based version of the application with the ability to run anywhere on an organization's network.

Managing LISAI

To successfully manage LISAI, our experienced team developed an approach to build an enriched database/index of unstructured and structured educational metrics, learning analytics, lessons learned and survey data with its core consisting of new AI technology for topic discovery. Developed by Bintel, Inc., these AI topic agents combine with document metadata and entity extraction to classify a wide variety of content.

We begin with the *Data & Design* phase. Our analyst collaborates with program and institutional experts to determine which courses would benefit the most. For example, an institution may desire to determine the strengths and weaknesses of three established programs whose enrollment numbers have been declining each year. Establishing these parameters early helps our team determine the initial analytics themes.

Our team designs and develops a baseline dashboard to build from the initial database results. At the same time, our analysts assist in determining the structured and unstructured data that

fulfills the required parameters to answer the desired question(s). As the data is gathered, QAA normalizes any unstructured data for analysis.

As we move into the *Train* phase, we identify themes in the data and train agents for each theme. By training agents directly from target survey content, the agents ensure consistency with the program's existing ontology. A key differentiator for our AI system includes our decision to use supervised machine learning which provides an intuitive, flexible tool that once trained delivers consistent results as part of the processing pipeline. QAA's team agent training process consists of supplying the agent with keywords and samples of the desired topic from the learning or educational (or other) content, including whole sentences and paragraphs.

Institutional or program approval is given for the taxonomy of the themes and any groupings desired across all training defined.

After completing the first two phases, we transition to the *Classify* phase where our team collaborates and reviews the results. We place the themes in rank order while scoring them based on similarity. Keep in mind, each topic agent can analyze millions of paragraphs and return a similarity score (between 0 and 1.5) for each, dependent on how closely the paragraph reflects the topic. This technology focuses on the detection of topics or themes at the paragraph and sentence level to accurately define the context of the text before performing more specific analyses such as sentiment, grammar, entity extraction, etc. This context adds substantial clarity to the structured response data.

Our agent similarity scores returned for each paragraph are consolidated into a final classification of topics. By adjusting the cutoff value, we achieve the consolidated similarity scores. This adjustable cutoff feature for classification provides the analyst with more flexibility working across dissimilar survey (or other topic) language.

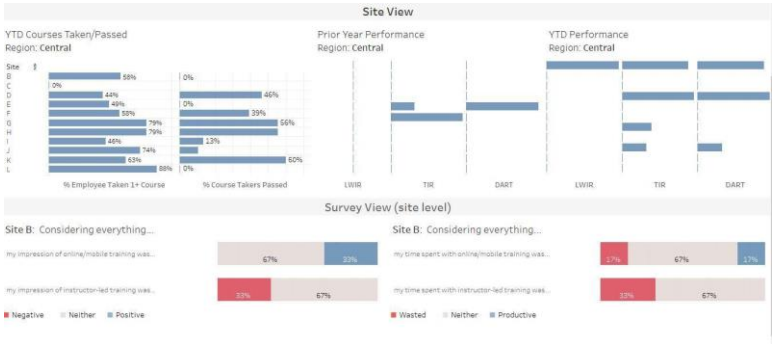
QAA's team reviews the dashboard and results with each program and institution allowing for feedback. We note any desired adjustments to be made with adjustments to themes. The process allows the analysts to drill down from a consolidated institution view to the details of a single

learner/instructor. The chain of custody and transparency of the data in the underlying database is a standard feature of LISAI.

During the *Analyze* phase, our analyst reviews data at intervals to identify relationships, anomalies within themes and new themes. The analyst adjusts the themes from the unstructured data as more analysis occurs and more data is received. Our agent training process allows for the boost in score if any specific obvious keywords or regex expressions are found. These additional word patterns discover topics previously missed with a Boolean search. Agents are retrained periodically to integrate relevant new terms and language patterns. Using a normalized similarity score, LISAI is more flexible across large variances in language so the same agents can be used for short survey responses and long form interview analytics.

LISAI adapts to become more insightful and ascertain more patterns in the data; thereby, expanding the analysis possibilities.

In the final *Report* phase, the data is collected for the identified program and institutional experts to review. In addition, our analyst provides monthly, quarterly and/or annual reports based on the desired educational metrics, learning analytics and periodic reporting plan. These reports include details of the questions asked as well other insights not realized until the data was gathered and analyzed. Other details include a summary of the conclusions, data points, insights of learners' needs and recommendations for future goals or objectives.



Conclusion

The QAA team understands the need to evaluate programs and courses. Educational resources are limited by cost, time and team; therefore, cumbersome, time-consuming data collection and learner analysis efforts can no longer be the status quo. AI has proven itself to be a solution for achieving reliable and valid results, without human bias and at scale. Because LISAI provides a better method to fuse data from digital and language formats, program and course groups will be able to analyze and respond more quickly to the educational needs of learners.

QAA is confident that LISAI provides a cost-effective method by delivering reliable, consistent educational metrics and learning analytics to support institutional and program decisions. Current users of the original technology LISAI is using include FedEx, NASA, Boeing and SwissRe.