CREATING INSIGHTS TO ACTIONABLE DATA

Have you ever felt that you can’t seem to find the information you want when looking at all the Education Data throughout your organization? Most organizations gather data in Student Information Systems (SIS), Assessment Systems, Learning Management Systems (LMS), and a myriad of other systems in which you are required to maintain data for Federal or other compliance-related reporting.

Reporting is not actionable; it is a snapshot of a period of time. For example, a real-time report of a student’s formative assessment gives you a score that informs stakeholders that the student passed or failed. But in the case of failure, it does not tell you what is more important: why they failed. Have they been struggling with a concept? Are they engaged with the course? For example, did the student attend lectures, complete assignments, reach out for help—get help, if they reached out? A snapshot report does not provide you with the insight to answer these types of questions.

In 2021, IDLA (Idaho Digital Learning Alliance) was searching for a vendor to lead, guide, and implement a project called Clarity, where “Actionable Insights” are acquired through data analysis that lead to meaningful action by the stakeholders (Figures 1 and 2). Actionable insights are defined as insights that can help decision-makers take timely action. Our objective is to support educators, administrators, students, and parents in making decisions based on actionable insights.

So how do you start this journey, and what path should you follow? This white paper aims to define the actionable insights that will answer your questions. Let’s start by outlining IDLA’s starting points (problems), then highlight the approach we undertook.
WHAT PROBLEM IS IDLA SOLVING?

In general, educators have a certain intuitive knowledge about their students. Great instructors obtain point-in-time data from various sources that support action-oriented decision-making, but technical overhead is required to obtain a complete view of the student experience. As a result, teachers tend to take action on narrower sets of information, which results in missed interventions or communications that may have improved student experiences. The richer information they seek includes engagement (for example, attendance), academic performance (grades, completed assignment, etc.), and various stakeholder perspectives on the student’s experiences —especially the areas in which the student is struggling.

IDLA took a proactive approach and started defining actions in which insights were needed (thus, what data are required to provide the insights—Figure 1). Their hypothesis is that Clarity would provide educators and other stakeholders with the information to support actionable insight on student engagement, academic progress, and perception.

Educators know students are missing assignments because they can look at the Grade Book for that individual student or students. Still, when you start to get to the root cause of what is going on beyond the missing assignment, it is much harder to get a simple view of what action or actions need to be taken. So, for instance, while the educator can determine that the student has missed several assignments, they have to look at other data to discern if they are attending classes, are engaged in the course, and to understand the student’s perception of whether what they are learning supports their growth. IDLA and most educational institutions have all the data necessary to make action-oriented decisions, but because the data was disorganized, it was very difficult to understand the total view of the student learning trajectory.
IDLA had years of data located in many systems and platforms. The migration to cloud computing furthered the distance of each data source beyond a single data center. IDLA used a combination of IAAS, PAAS, and SAAS solutions for students. In addition, GSuite communications like emails, phone calls (Google Voice), text messages, and video conferencing (Google Meet) provide new opportunities for analysis. When combined, all the above data can provide stakeholders insight into the student’s needs in real-time. In a non-automated world, it is unrealistic to assume the educator has the time and energy to review all these systems to identify students that are struggling. Increasing numbers of courses and students only compound the difficulty of an educator gaining actionable insight, in time, to serve the stakeholders’ needs.

IDLA understood they had to drive the data the last mile (Figure 1), thus the creation of the Clarity vision and the formation of the objectives. The vision and the objectives are very important. If you are considering undertaking a project like this, they should be carefully considered, outlined, and solidified.

**FIGURE 1:**
**DRIVING BIG DATA THE LAST MILE**
In education, we have all kinds of reports, most of which are static. But the best information provides insights into the actionable data, so in Figure 2 we are reminded that, in static reports, we don’t necessarily see what we think we see. For example, if given a static report, we see a snapshot, but not the full perspective (student 360-degree view) necessary to make data actionable and provide insights to the key stakeholders (key stakeholders at IDLA are students, educators, administrators, parents, or any person expected to make specific, actionable decisions). The image in Figure 2 without insights (glasses) is difficult to visualize. Have you ever asked a question like, “why does ‘Student A’ struggle?” Without proper insights into that student’s data, you are looking at the picture without the right perspective.

This leads us to the objective of Clarity: to connect the disconnected data; determine what information provides insight into challenges for educators, administrators, students, and parents; and recommend actions to improve student outcomes.

IDLA and LearningMate recommended a strategy aimed at building informed (actionable) insights for education stakeholders. The choice to build this solution on the Google Cloud Platform was due to the powerful suite of data tools Google makes available to education, the ease of GSuite integration, and the use of Google’s Authentication to keep data secure.

IDLA’s other critical objective is to ensure all the work of building Clarity could be shared with the larger educational community. IDLA wants to share best practices and lessons learned to help other educators and stakeholders reap the benefit of insight into student engagement, create lasting and positive experiences (perspective) and, most importantly, ensure that all students can attain the academic objectives outlined in the course.

Having discussed the problem and the vision, the most important part of any project is demonstrating success to all stakeholders.
One of the key qualitative risks associated with big data projects is confirmation bias. Confirmation bias is the tendency to search for, interpret and favor data or information that supports your existing beliefs or ideas. Actionable insights are meant to help you make informed decisions based on data, but if actionable insight reports reinforce what you already believed, then the risk of making a bad decision about the project’s outcomes is higher. IDLA and LearningMate are focused on ensuring confirmation bias is mitigated throughout the project by involving all the stakeholders during the planning process and ensuring that each stakeholder can provide input throughout the project.

Start with the actions or decisions your stakeholders desire and what insight is necessary to provide that action. These insights ultimately dictate what data will be needed to make the necessary actions or decisions.

Establishing success criteria and mitigating risk are keys to successful project delivery. Establishing success criteria helps students learn without bogging them down with an overwhelming process or providing too much information in the classroom. Properly defined success criteria provide the following:

- Focus on well-defined goals, objectives, and outcomes
- Opportunities to improve understanding
- Allows all stakeholders to identify their own objectives and achievements
- Increased awareness of where challenges or risks lie
- Clears a pathway for improvement
- Lets each stakeholder monitor progress and empowers them to identify risk

In other words, recognizing the standards you’ve created for your success allows you to understand when you’re meeting them, when you’re not, and what you can do to change outcomes.
DEMONSTRATE SUCCESS

DETERMINE CRITICAL SUCCESS FACTORS

Identifying Critical Success Factors (CSFs) must necessarily involve the stakeholders who will be performing the actions. IT teams should be involved in the meetings but more as a guide to what is possible than as owners with the responsibility of determining CSFs on their own. CSFs are best stated as action phrases with desired outcomes and that may include the means and/or measures, as well as the action intended with the data. To use one example from IDLA’s implementation of the Clarity project:

DESIRED OUTCOME:

IMPROVEMENTS TO IDLA’S PORTAL, WHICH GIVE PARENTS AND STUDENTS ACCESS TO CRITICAL INFORMATION INCLUDING:

- Provide a snapshot of student status before entering the course so parents and students can quickly see areas that need attention
- List of late assignments allowing students to prioritize their time
- List of upcoming assignments and due dates enabling students and parents to plan
- Activity numbers over the past week so they can see how their activity impacts their outcomes
- Contact information for teacher/site coordinator/support staff so they can quickly reach out for help

Doing this work upfront enables the Program and Technical teams to understand what they achieve. It also enabled IDLA to build an RFP (Request For Proposal) that clearly defined the outcomes for potential vendors.
Several approaches can be implemented to move from gathering the requirements to creating actionable dashboards. Early in the requirements gathering stage, LearningMate guided IDLA stakeholders to identify the critical success factors (CSFs) that aligned with their vision of Clarity. Once the CSFs were clear, they implemented a process of gathering end-user requirements that focused on actionable data elements. Below are steps that were taken to work with stakeholders and come up with the Critical Success Factors.
Meaningful conversations with stakeholders around their work are critical for asking questions that elicit requirements. In addition, asking questions using the same terminology they use in their day-to-day environment helps avoid ambiguity and miscommunication. Thus, the first step of requirement gathering is doing sound background research.

This process begins before interviews and involves going through the institute website, reading documents shared by the client, and understanding what level of access will be needed to the applications from which data needs to be integrated.

**THE INSTITUTION**
- The organizational structure
- User roles and responsibilities
- The relationships between roles at the organization and the student
- Student profiles and common activities
- Content offerings and repeatable structures (course structure)

**SOURCE APPLICATIONS FROM WHICH DATA NEEDS TO BE TRANSFORMED INTO A DATA WAREHOUSE**
- Overall what systems are used and how are they experienced by various users (roles)
- What applications can do and possible gaps in automation structures (course structure)

**SELECT THE RIGHT PEOPLE FOR FOCUS GROUPS**
- Focus group participants should represent the majority of stakeholders
- Great communications skills, open-minded, and flexible
- Truly understands the objectives and goals of the organization
DEFINING WHAT ACTIONABLE DASHBOARDS ARE REQUIRED WITH STAKEHOLDERS/USERS

PREPARE FOR AND CONDUCT PRELIMINARY INTERVIEWS

There could be more than one round of interviews to get the depth of knowledge necessary to deliver the results desired by the stakeholders. In order to have success, it is crucial to collaborate with stakeholders to identify those who bring the most to the project (knowledge, passion). Create a list of users, identify why they are essential to the project, and get the necessary contact information.

First, preliminary interviews helped determine each interview candidate’s knowledge of the organization’s objectives for the project. In this case, IDLA’s preliminary interviews leveraged several participants (typical interview duration of one to one and a half hours). These interviews were conducted to determine users’ knowledge and identify the individuals best suited for a deeper dive into dashboard requirements.

CONDUCT CONTEXTUALIZED CONVERSATIONS WITH A PURPOSE

Contextualized conversations include in-depth interviews where each conversation is designed with a purpose (Webb and Webb, 1932, pg. 130). Such interviews combine structure with flexibility, with the key objective of getting a deeper and fuller understanding of the participant’s points.

IDLA’s objective was to gather likely requirements for the dashboards they would develop. These in-depth interviews were required to get as much contextual information as possible about each dashboard’s core objective. More specific activities are listed below:

- Create Interview Discussion Guides: Keep in mind overall goals, detail various source systems of interest, and the desired end user input for the dashboard(s). As these in-depth interviews are more exploratory in nature, the discussion will be free-flowing, but the discussion guide will keep conversation within the overall scope.

- Create an engagement plan: Engage the end-users. Be attentive and ask questions, and probe their understanding of the dashboard(s) actionable requirements based on the insight the user is articulating (What question is the user asking of the data?). What the end-user says or does not say is important.

- Record the interviews so all team members can revisit the ideas captured.
DEFINING WHAT ACTIONABLE DASHBOARDS ARE REQUIRED WITH STAKEHOLDERS/USERS

CREATE MOCKUPS AND ACTIONS BASED ON THE INTERVIEWS

It is important to create dashboard samples quickly following the interviews. You can use any tool available to you. For example, IDLA used Google Sheets. Begin with a thorough analysis of your notes from the interview discussion guide and your engagement plan to create a dashboard sample (in a spreadsheet/sheets) with content, ideas, and metrics. Ensure that data is decoupled from design at this stage so that the focus is solely on the data/content. By doing this, your sample should focus on content and data, and not user interface design. Some considerations are as follows:

- Analyze the in-depth interview data. Listen to the interview recordings until you are clear about the explicit and tacit needs. Tie back what is said to the background research done (Interview Discussion Guide). If necessary, conduct secondary research, recreating scenarios in the source systems to better understand your participant’s (users) expectations.

- Create a list of measures of interest. Then, sensibly structure them in Sheets using a dashboard/report kind of layout.

- To this structure, add relevant (i.e., at least a subset of what is actually used) option sets/descriptors for programs, courses, sections, phases of courses, etc.

- Create and add realistic mock data for the identified measures. This is an essential step to help end-users relate better to the content/ideas.

RE-ENGAGE THE FOCUS GROUP

By this point, you should have more-complete mockups to re-engage your focus groups. Also, bring in new participants to ensure all requirements were gathered. Establish a focus group for each dashboard. Be sure to include representation from various sub-groups. For example, a dashboard targeted at teachers should have representation by various program stakeholders, including administrators and technical team members. With these preliminaries completed, the next step is to

TEST OUT THE CONTENT/IDEAS IN A FOCUS GROUP.
DEFINING WHAT ACTIONABLE DASHBOARD ARE REQUIRED WITH STAKEHOLDERS/USERS

RE-ENGAGE THE FOCUS GROUP2

The approach to this second round of focus groups is different from the in-depth interview. Instead, the group interaction is explicitly used to generate data and insights (Morgan, 1997).

Specific to IDLA: the primary objective was to test the dashboard samples using inputs from the in-depth interviews: the metrics’ usefulness (or lack of usefulness), potential additions or enhancements, as well as simply to get a deeper and more diverse understanding of possible areas where the in-depth interviews didn’t provide rich inputs. Some important considerations:

- Encourage everyone in the group to participate. Call out names of those not participating and seek their views too. Listen to everyone. The goal is to have a collaborative discussion.

- Trigger a meaningful discussion. Leverage notes captured in preliminary and contextual interviews to focus the discussion when others can’t recall previous interviews. In addition, it is a good idea to share notes with all users.

- Immediately after the focus group, send out a short survey to capture additional feedback from participants.

- Make a point to clearly narrate the content/ideas in sheets to the participants. Clarify participant concerns as they are raised (if a concern cannot be clarified, capture this and schedule a one-on-one with that stakeholder to ensure resolution). If new ideas are generated, show additional working examples in sheets.
“Design under constraint. Data to shine.” Refine Dashboard samples (content/ideas) in sheets based on input received during the focus group and from the post-focus group feedback survey. Use these updated samples as input to create the visual design.

- Debrief the design team on focus group feedback, but ensure you give the design team full creative freedom to develop the wireframes.

- Wireframes should be created keeping in mind the tool/method used to deploy the dashboard in the production environment. For example, should a BI tool be used for reporting, then the wireframes need to be developed under those constraints.

Don’t design something that would not be possible with the selected BI tool; it only creates client frustration.

- The Design and Data team should work closely to ensure that in all the design work the data stand out (i.e., is easy to remember, can be read/interpreted easily - in isolation and in conjunction with other data points) and the data is represented as intended.

- Reconvene the focus groups for each specific dashboard and take two passes on the design to be fine-tuned based on client feedback. (An important note: If there are issues and concerns from the stakeholders, they should be resolved and not go further until they are resolved).

The exhibit above shows custom-built visualization components using a helper library provided by the BI tool. The design team worked closely with the developers to create the best possible representation under given constraints.
BUILDOUT DASHBOARDS IN GOOGLE DATA STUDIO

“Develop the dashboard using the BI tool.” A prerequisite to creating dashboards is to have the report datasets (or views, as applicable) used to build the reports. Thus, ensure that report datasets (or views) for the dashboards are created correctly - developed through the documentation on report data points and the involved calculation logic. Some further points to consider:

- Use the approved wireframes as a reference to create the dashboards.
- Using the Google Data Studio connect the report datasets and create the dashboards. Since the design was developed under the bounds of what the BI Tool can do, translating the wireframe into a dashboard in the chosen BI Tool should not be a huge challenge.
- Think of each dashboard in terms of versions. Use learnings from across your body of work to improve the initial version of the dashboards. Examples of enhancements:
  - Recommend changes that help simplify (increase usability) each dashboard
  - Make modifications that provide a more uniform interpretation of the data
  - Add additional relevant metrics/descriptors (including filters)
Reconvene the focus groups for each specific dashboard, demonstrate the functionality, and ensure that it is traceable to the requirements gathered in preliminary review phases. Key considerations here are as follows:

- Get approval for Final Dashboards. Any missed requirements may necessitate additional dashboard buildout steps.
- Once approval is complete, connect the data to the dashboards.
- Perform initial live production testing to address security, performance, and usability issues and concerns.

CONCLUSION

The process of getting actionable data in the hands of stakeholders who can make a difference in student experiences (perception), interactions (activity), and outcomes does not start with connecting data; it begins with connecting people. Investing time to set the vision, define critical success factors, and engage stakeholders leads to products that have buy-in, give clear deliverables to technical teams, and most importantly, leads to meaningful data that will get used to improve student outcomes.

References:

Chapter 7. In-Depth Interviews, Qualitative Research Practice: A Guide for Social Science Students and Researchers, SECOND EDITION. Edited by: Jane Ritchie, Jane Lewis, Carol McNaughton Nicholls, Rachel Ormston [Publisher: book webpage]

Chapter 8. Focus Groups, Qualitative Research Practice: A Guide for Social Science Students and Researchers, SECOND EDITION. Edited by: Jane Ritchie, Jane Lewis, Carol McNaughton Nicholls, Rachel Ormston [Publisher: book webpage]
ABOUT THE ORGANIZATIONS

Idaho Digital Learning Alliance was created by the Idaho State Legislature and Idaho educators, developed for Idaho students, and is recognized as a leader across the nation in online virtual education. Idaho Digital Learning Alliance was created to provide access, equity, and flexibility for students in the state of Idaho according to its statutory authority, and Idaho Digital Learning Alliance enables the state to meet its constitutional requirement to provide a uniform and thorough educational system. By creating Idaho Digital Learning Alliance, an online state school, the Idaho Legislature, school administrators, and school boards created a collaboration of 115 school districts with highly qualified teachers, online courses, virtual services, and eLearning expertise for the state in online virtual education policy, procedure, and implementation.

LearningMate focuses on the needs of next-generation learners. The company builds on a strong foundation of learning design with progressive technology, digital media, and engineering solutions to connect today’s learners, educators, administrators, policymakers, and content creators with the information, tools, and solutions they need to be successful. With six consulting offices in the United States, the United Kingdom, Canada, and India, LearningMate serves a global clientele of education publishers, traditional and non-traditional EdTech companies, K-20 schools, universities and career colleges, government agencies, non-profits, corporate learning departments, and education consortia. Learn more at www.learningmate.com. If you would like to reach out to a Solution Expert, please email mark.masterson@learningmate.com or call 480-375-0693.

Google Cloud is committed to advancing learning for everyone. From building serverless apps to easily infusing AI into your data, we are here to help solve your biggest challenges in education and workforce development. Reach learners and educators worldwide by integrating your services with our Google for Education tools. Explore our cloud solutions, teaching tools, and affordable devices that help transform classrooms, academic institutions, and EdTech companies: https://google/edusolutions