INSIGHTS TO ACTIONABLE DATA

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CREATING INSIGHTS TO ACTIONABLE DATA

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Have you ever felt that you can't seem to see what you are looking for 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 that you are required to maintain data for Federal or other compliance-related reporting.

Reporting is not actionable; it is a snapshot in 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. What it does not tell you is more important; it does not explain why they failed. Have they been struggling with a concept, are they engaged with the course? For example, did the student attend lectures, did the student complete assignments, did they reach out for help, did they get help, etc.? 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" is acquired through data analysis that leads 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 provide a simple path to define the actionable insights that will answer your questions. Let's start by outlining IDLA starting points (problems) and then highlight the approach we undertook.

WHAT PROBLEM IS IDLA SOLVING?

It can be accurately stated that, 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 instead took action on narrower sets of information resulting in missed markers for intervention or communication that would have improved student experiences. The richer information they sought includes; engagement (for example, attendance), academic performance (grades, completed assignment, etc.), and perception of all stakeholders on the experience they are having or bottom line the areas the student is struggling.

IDLA took a proactive approach and started defining actions in which insights were needed (thus, what data is 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 yes, the educator can determine that the student has missed several assignments. However, you have to look at other data to discern if they are attending classes, are engaged in the course, and whether the student's perception of what they are learning supports learning and growth. IDLA and most educational institutions have all the data necessary to make action-oriented decisions, but because the data was disconnected, it was very difficult to understand the total view of the student learning trajectory.

WHAT PROBLEM IS IDLA SOLVING?

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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 that the educator has the time and energy to review all these systems to identify students that are struggling? Considering how many courses and students an educator has only compounds the difficulty of gaining actionable insight, in time, to serve the stakeholders' needs.

IDLA understood that they had to drive the data the last mile (Figure 1), thus the creation of the Clarity vision and the formation of the objectives (Note: The vision and the objectives are very important, and they need to be clearly outlined and solidified before you undertake a project like this).

FIGURE 1:
DRIVING BIG DATA THE LAST MILE

TURNING ***BIG DATA*** INTO ***INSIGHT*** INTO ***ACTION***

CLARITY
OF VISION

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In education, we have all kinds of reports. The difference in these reports is most are static, where the best information provides insights into the actionable data. In Figure 2, we are reminded that 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. The image in Figure 2 without insights (glasses) is difficult to visualize. The key stakeholders at IDLA are students, educators, administrators, and parents, or any role where you expect someone to make specific, actionable decisions. 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.

Leading 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 towards building informed (actionable) insights for education stakeholders. The choice to build this solution on the Google Cloud Platform was purposeful 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 of the work of building Clarity could be shared with the larger educational community. IDLA wants to share the best practices and learnings to help other educators and stakeholders to reap the benefit of insight into student engagement, create lasting and positive experiences (perspective) and, importantly, ensure the academic objectives outlined in the course/class are attainable by all students. Having discussed the problem and the vision, the most important part of any project is demonstrating success to all stakeholders.

FIGURE 2:
CLARITY IS WHAT WE ARE ALL LOOKING FOR.

DEMONSTRATE SUCCESS

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FIGHT CONFIRMATION BASIS BY INVOLVING STAKEHOLDERS EARLY

One of the key qualitative risks associated with big data projects is confirmation bias. Confirmation bias is defined as a 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 confirmations are mitigated throughout the project by involving all the stakeholders during the planning process and ensuring that each stakeholder can provide input for the project's success throughout the project milestones.

DEFINING INSIGHTS TO ACTIONABLE DATA FROM A STAKEHOLDER PERSPECTIVE

Start with the actions or decisions your stakeholder's desire and what insight is necessary to provide that action which ultimately drives the needed data to make the necessary actions or decisions.

ESTABLISH SUCCESS CRITERIA

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:

- Focus on well-defined goals, objectives, and outcomes
- Provides opportunities to improve understanding
- Allows all stakeholders to identify their own objectives and achievements
- Increases 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

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DETERMINE CRITICAL SUCCESS FACTORS

It is critical that the identification of Critical Success Factors (CSFs) involve the stakeholders performing the actions. IT teams should be involved in the meetings but more as a guide to what is possible rather than owning 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 only one IDLA example for 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.

WORKING WITH STAKEHOLDERS TO DETERMINE CSFS

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.

FIGURE 3:
STEPS TO ACTIONABLE DASHBOARDS

DEFINING WHAT ACTIONABLE DASHBOARDS ARE REQUIRED WITH STAKEHOLDERS/USERS

"KNOWING IS HALF-THE-BATTLE." (GETTING ORGANIZED)

Meaningful conversations with stakeholders around their work are critical for asking questions that elicit requirements. In addition, asking questions using the terminology they use in their environment helps avoid ambiguity of answers 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 required access privileges to 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 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 representatives 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[1]

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 the individual's knowledge of the organization's objectives for the project. In this case, IDLA's preliminary interviews leveraged several IDLA participants (typical interview duration of 1-1.5 hours). These interviews were conducted to determine users' knowledge and identify those required for a deeper dive into requirements by the dashboard.

CONDUCT CONTEXTUALIZED CONVERSATIONS WITH A PURPOSE

Contextualized conversations with a purpose 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 is to gather likely requirements for developing dashboards. These in-depth interviews are 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 guide 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, at IDLA, we 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 overall sample at this stage **focuses 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[2]

Ensure now that you have completed mockups to re-engage your focus groups that provided contextual requirements and add new participants to ensure all requirements were gathered. A focus group is established for each dashboard. Another critical point is to ensure 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 from IDLA). With the preliminaries completed, the next step is:

"TEST OUT THE CONTENT/IDEAS IN A FOCUS GROUP"

DEFINING WHAT ACTIONABLE DASHBOARDS ARE REQUIRED WITH STAKEHOLDERS/USERS

RE-ENGAGE THE FOCUS GROUP[2]

The approach to these focus groups changes from the in-depth interview. Instead, the group interaction is explicitly used to generate data and insights (Morgan, 1997).

Specifically to IDLA: the primary objective is to test out the 'dashboard sample (content/ ideas) in sheets' developed using inputs from the in-depth interviews- the usefulness of the presented metrics, metrics that can be dropped, enhancements that can be done, additional metrics that can be added; and also to get a deeper/more diverse understanding in areas where the in-depth interviews didn't provide rich inputs. Some important considerations:

- 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 closure of the concern or issue). If new ideas are generated, show additional working examples in sheets.
- Encourage everyone in the group to participate. Call out names of those not participating and seek their views too. Listen to everyone. Ideally, the goal is to have a collaborative discussion.
- To trigger a meaningful discussion, leverage notes captured in preliminary and contextual interviews so that the discussion can be focused when others can't recall interview discussions. 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 that participants want to provide.

ANOTHER DESIGN
AEVOLUTION

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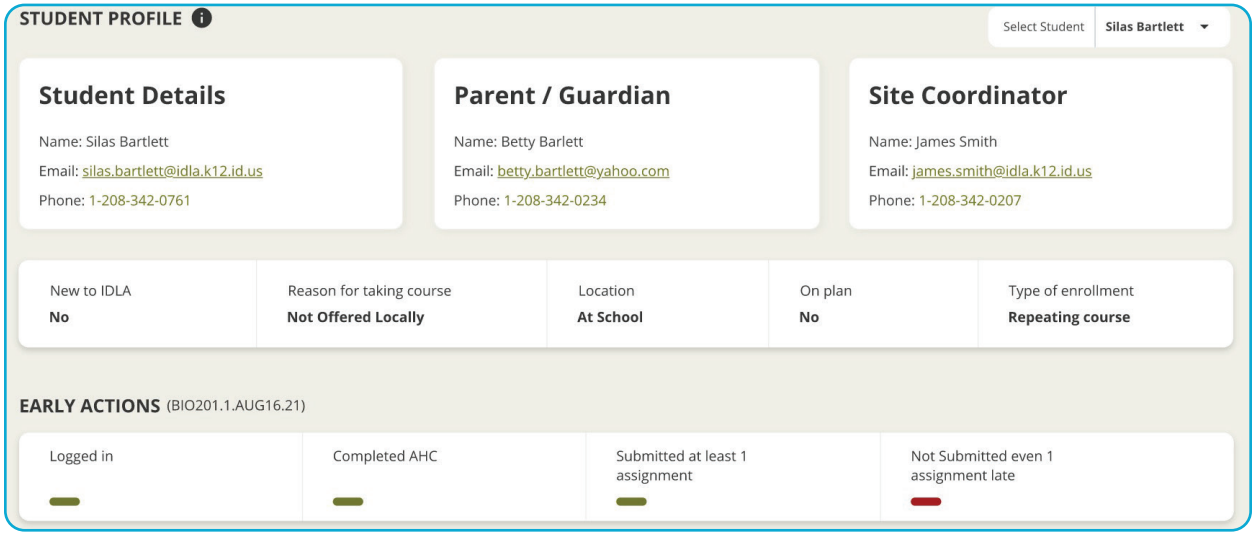
"Design under constraint. Data to shine." Refine Dashboard samples (content/ ideas) in sheets based on input received during the focus group and from the post-focus group feedback survey. Use these updated samples as input to create the visual design.

- 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 finetuned 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 co-create the best possible representation given the constraints and limitations for customizations.

BUILDOUT DASHBOARDS IN GOOGLE DATA STUDIO

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"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. Enhancements could be in terms of:
- Recommend changes that help simplify (increase useability) each dashboard
- Make modifications that provide a more uniform interpretation of the data
- Add additional relevant metrics/ descriptors (incl. filters)

LAST REVIEW ITERATION

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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 (If necessary, the last step in the buildout of dashboards might have to be completed for any missed requirements)
- 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:

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ABOUT THE ORGANIZATIONS

IDAHO DIGITAL LEARNING ALLIANCE

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.

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