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Diagnostic Assessment Using Google Forms and Looker Studio to Map Students' Learning Preferences

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ABSTRACT

Diagnostic assessment can provide teachers with timely information about students' initial characteristics and support responsive instructional planning. This descriptive-analytic study documents a digital workflow using Google Forms for data collection and Google Data Studio (now Looker Studio) for visualization. Participants were 100 Phase E students at SMAN Cahaya Madani Banten Boarding School, Pandeglang, Banten. A validated initial-assessment instrument was converted into Google Forms; responses were recorded automatically in a spreadsheet and visualized through an interactive dashboard. The descriptive results classified students' self-reported modality preferences as auditory (44%), visual (31%), and kinesthetic (25%). The workflow reduced manual recapitulation and produced individualized, readable summaries for teachers and students. These categories should be interpreted as reported preferences rather than fixed learning styles, because current evidence does not support matching instruction to presumed learning-style categories. Accordingly, the principal contribution is the digital diagnostic workflow itself: efficient data collection, transparent visualization, and evidence-informed support for differentiated planning. Future studies should examine instrument reliability, validity, usability, and whether dashboard-informed differentiation improves measurable learning outcomes.

Keywords: diagnostic assessment; differentiated instruction; Google Forms; learning analytics; Looker Studio

INTRODUCTION

Indonesia's Merdeka Curriculum emphasizes flexible learning, attention to student characteristics, and the use of assessment information to inform instruction. In the source study, this orientation is linked to Ki Hajar Dewantara's view that education should guide each learner according to individual potential and context. The practical challenge is therefore not merely to collect student information, but to transform it into usable evidence for instructional decisions. Contemporary assessment research similarly positions diagnostic and formative assessment as processes for eliciting evidence, interpreting learner needs, and adapting teaching (Bennett, 2011; Black & Wiliam, 2009; Heritage, 2018; Schildkamp et al., 2020; Wiliam, 2011).

Digital platforms can strengthen this process by reducing administrative burden and accelerating feedback. Online forms support standardized collection and automatic tabulation, while dashboards can

aggregate and communicate patterns that would otherwise remain difficult to interpret (Bodily & Verbert, 2017; Ifenthaler & Yau, 2020; Matcha et al., 2020; Schwendimann et al., 2017; Verbert et al., 2014; Viberg et al., 2018). The present study therefore documents a workflow in which Google Forms captures diagnostic responses and Google Data Studio visualizes the resulting data for teachers and students.

A methodological qualification is important. The original instrument describes auditory, visual, and kinesthetic tendencies as "learning styles." However, a substantial evidence base has not confirmed the meshing hypothesis that students learn better when instruction is matched to such categories (Cuevas, 2015; Husmann & O'Loughlin, 2019; Kirschner, 2017; Newton & Salvi, 2020; Pashler et al., 2008; Riener & Willingham, 2010; Rogowsky et al., 2015). For publication accuracy, this article therefore reports the source data as self-reported learning preferences and does not infer stable cognitive types. The research objective is to describe the digital diagnostic-assessment procedure, summarize the observed preference distribution, and discuss its appropriate use for differentiated planning.

LITERATURE REVIEW

Diagnostic and Formative Assessment

Assessment becomes instructionally valuable when evidence is used to decide what learners know, what they need next, and how teaching should respond. Research on formative assessment highlights feedback, learner participation, and responsive teaching rather than testing alone (Andrade, 2019; Hattie & Timperley, 2007; Kingston & Nash, 2011; Lipnevich & Panadero, 2021; Panadero et al., 2018; Rakoczy et al., 2019; Wisniewski et al., 2020). Diagnostic assessment extends this logic to the beginning of instruction by identifying prior knowledge, readiness, misconceptions, and relevant learner characteristics. Technology-enhanced assessment can improve timeliness and data accessibility, although validity, accessibility, privacy, and teacher assessment literacy remain essential (Redecker & Johannessen, 2013; Shute & Rahimi, 2017; Tempelaar et al., 2020; Yan et al., 2021).

Differentiated Instruction and Learner Variability

Differentiated instruction is best understood as purposeful adaptation of content, process, support, grouping, and products in response to meaningful evidence of learner readiness and need. Reviews and empirical studies show that differentiation can be beneficial when it is systematic, feasible, and tied to learning goals rather than superficial labels (Bondie et al., 2019; Deunk et al., 2018; Gheyssens et al., 2020; Pozas et al., 2020; Smale-Jacobse et al., 2019; van Geel et al., 2019). Learner variability is multidimensional and includes prior knowledge, motivation, language, self-regulation, interests, and contextual factors. Consequently, diagnostic dashboards should support flexible hypotheses about learners, not permanent classifications.

Digital Data Collection, Dashboards, and Learning Analytics

Learning-analytics research shows that dashboards can make complex educational data visible and actionable, but their value depends on design, interpretation, and the decisions they enable. Effective dashboards should present relevant indicators, avoid cognitive overload, and connect information with pedagogical action (Jivet et al., 2018; Klerkx et al., 2017; Park & Jo, 2019; Sedrakyan et al., 2019; Susnjak et al., 2022). Broader evidence on educational technology also cautions that tools do not improve learning by themselves; impact depends on pedagogy, teacher capacity, and implementation quality (Bond et al., 2020; Crompton et al., 2021; Martin et al., 2020; Rapanta et al., 2020; Trust & Whalen, 2020). This perspective frames Google Forms and Looker Studio as infrastructure for evidence use rather than as instructional interventions in their own right.

METHODS

Design and Participants

The study used a descriptive-analytic design. Participants were 100 Grade 10 (Phase E) students at SMAN Cahaya Madani Banten Boarding School in Pandeglang, Banten. The object of analysis was the students' response pattern on an initial diagnostic instrument intended to describe modality-related learning preferences. The source manuscript reports that the instrument was reviewed for content and language before digital administration.

Digital Assessment Workflow

The validated instrument was transferred to Google Forms. Students completed the form online, and responses were recorded automatically in a connected spreadsheet. The spreadsheet was then linked to Google Data Studio to generate visual summaries and descriptions. The workflow can be represented as: instrument preparation → content/language validation → Google Forms administration → spreadsheet capture → dashboard visualization → teacher/student interpretation. Descriptive frequencies were used; no inferential test or causal comparison was conducted.

Assessment component	Purpose
Non-cognitive diagnostic assessment	Describe psychological/social-emotional context, home-learning activity, family/social background, interests, character, and self-reported preferences.
Cognitive diagnostic assessment	Identify competency attainment, support instructional adjustment, and identify learners requiring additional support.

RESULTS AND DISCUSSION

Digital Diagnostic Workflow

The digital procedure successfully moved responses from Google Forms into a spreadsheet and then into a visual dashboard. In practical terms, the workflow reduced manual recapitulation and enabled rapid inspection of individual and group patterns. This aligns with learning-analytics research showing that visualization can support awareness and pedagogical decision making when indicators are understandable and tied to actionable questions (Bodily & Verbert, 2017; Jivet et al., 2018; Matcha et al., 2020; Schwendimann et al., 2017).

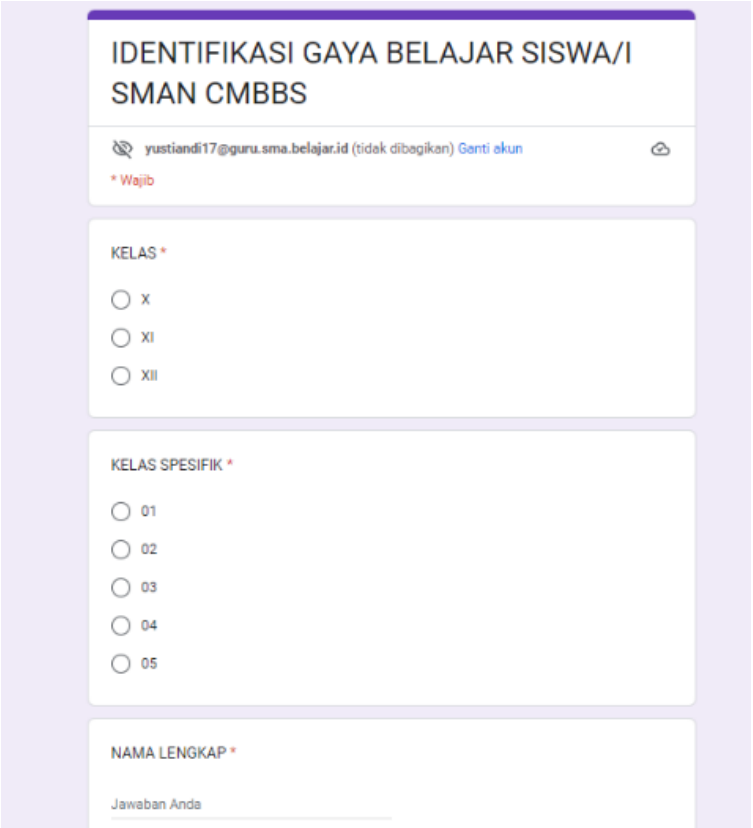


Figure 1. Google Forms interface used for the diagnostic assessment.

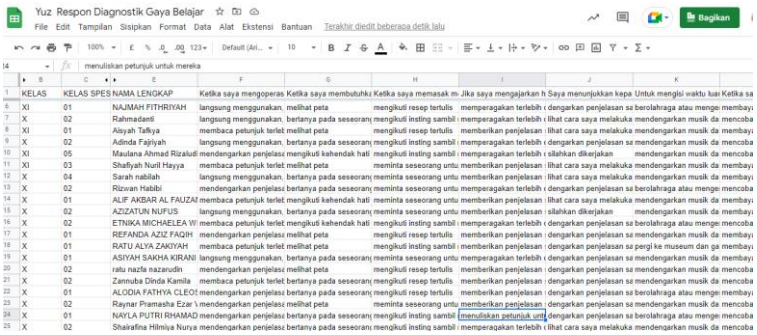


Figure 2. Spreadsheet record of student responses.

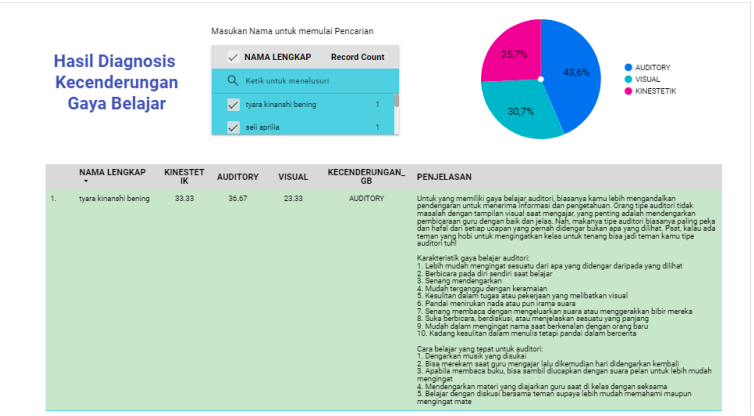


Figure 3. Looker Studio dashboard visualization of individual learning-preference results.

Distribution of Self-Reported Learning Preferences

Among the 100 respondents, 44 students were classified as auditory, 31 as visual, and 25 as kinesthetic according to the source instrument. Thus, the largest category was auditory (44%), followed by visual (31%) and kinesthetic (25%). These figures are descriptive and should not be interpreted as evidence that instruction must be matched to a fixed modality. Experimental and review literature has repeatedly found insufficient evidence for learning-style matching (Cuevas, 2015; Husmann & O'Loughlin, 2019; Newton & Salvi, 2020; Pashler et al., 2008; Rogowsky et al., 2015). A more defensible use is to treat the responses as conversation starters about study habits, preferences, engagement, and access while combining them with stronger diagnostic evidence such as prior knowledge and task performance.

Preference category	Students	Percentage
Auditory	44	44%
Visual	31	31%
Kinesthetic	25	25%
Total	100	100%

Implications for Differentiated Planning

The dashboard can still be pedagogically useful when it supports flexible planning. Teachers may use the information to diversify representations, examples, participation structures, and product options

while monitoring actual performance. Such an approach is consistent with evidence that differentiation is strongest when based on ongoing assessment and responsive grouping rather than fixed learner labels (Deunk et al., 2018; Smale-Jacobse et al., 2019; van Geel et al., 2019). The study therefore contributes a replicable low-cost data workflow, while the instructional interpretation should remain evidence-informed and revisable.

Limitations

The study is descriptive, involves one school and 100 students, and does not report psychometric reliability, construct validation, comparison groups, or learning-outcome effects. The modality categories originate from a self-report instrument and should not be treated as validated cognitive learning styles. In addition, dashboard usability, data privacy, teacher decision quality, and the effect of dashboard-informed differentiation were not directly measured. These limitations restrict generalization and causal claims.

CONCLUSION AND RECOMMENDATIONS

Google Forms and Google Data Studio provided an efficient workflow for collecting, tabulating, and visualizing initial diagnostic-assessment data. The source instrument classified 44% of students as auditory, 31% as visual, and 25% as kinesthetic. The main educational value of the approach lies in rapid evidence organization and visualization for instructional planning, not in assigning fixed learning-style identities. Teachers are advised to combine dashboard information with prior-achievement evidence, observation, student work, interests, and ongoing formative assessment. Future research should validate the diagnostic instrument, examine dashboard usability and privacy, and test whether data-informed differentiated instruction improves student engagement and achievement.

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