JURNAL MANAJEMEN PENDIDIKAN ISLAM
UNIVERSITAS ISLAM NEGERI SUMATERA UTARA
Email: jurnal-benchmarking@uinsu.ac.id
Available Online at: https://jurnal.uinsu.ac.id/index.php/benchmarking/index
BENCHMARKING
JURNAL MANAJEMEN PENDIDIKAN ISLAM

ANALYSIS OF INTERACTIVE DIGITAL MEDIA NEEDS BASED ON LOCAL WISDOM FOR STRENGTHENING CULTURAL LITERACY IN ELEMENTARY SCHOOL IPAS LEARNING

Fitrotis Sa'adah[1], Maretha Dellarosa[2], Fiena Saadatul Ummah[3]
Universitas Negeri Surabaya, Indonesia[123]
25010855085@mhs.unesa.ac.id[1], marethadellarosa@unesa.ac.id[2],
fienaummah@unesa.ac.id[3]

Received:08-01-2026
Revised: 09-01-2026
Accepted: 22-06-2026

Abstract
The acceleration of digital technology and the shifting learning characteristics of Generation Alpha demand elementary school instruction that remains contextual, meaningful, and culturally grounded. Integrated Natural and Social Sciences (IPAS) learning carries strategic potential for connecting natural, social, and cultural concepts, yet classroom practice still relies on generic national teaching resources with limited local cultural enrichment. This study analyses the needs for interactive digital media based on local wisdom to strengthen cultural literacy in elementary school IPAS learning. A needs analysis design was applied by combining a quantitative descriptive strand and a qualitative strand. Data were obtained through a needs questionnaire, semi-structured interviews with upper-grade IPAS teachers, classroom observation, and document study at a public elementary school in Gresik Regency. Quantitative data were analysed through measures of central tendency, dispersion, and achievement percentage, while qualitative data were processed through data condensation, data display, and verification, supported by source and technique triangulation. The needs level reached a mean of 6.85 with a standard deviation of 1.20 and a coefficient of variation of 17.5%, which indicates a high and homogeneous need. Integration of local culture and traditions became the highest priority (87.5%), followed by interactive visual elements (85.2%) and contextual examples drawn from the students' environment (82.6%). Teachers require media that are operable, aligned with student characteristics, and capable of linking IPAS content with the coastal local wisdom of Gresik. BESTARI interactive digital media is positioned as a conceptual solution grounded in these empirical needs and is prepared for subsequent development and effectiveness testing.

Keywords: cultural literacy; IPAS learning; local wisdom; interactive digital media; needs analysis

(*) Corresponding Author: **Fitrotis Sa'adah, 25010855085@mhs.unesa.ac.id**

INTRODUCTION

The acceleration of digital technology has reshaped the way elementary school students access information, construct meaning, and interact with their social environment. Learners currently occupying elementary classrooms belong to Generation Alpha, a cohort that grows within a visual, interactive, and screen-mediated ecosystem from a very early age (McCrindle, 2019). This condition demands instructional practices that are adaptive to technological change while remaining anchored in meaningful and contextual learning experiences. Digital globalisation simultaneously produces a competing pressure, namely the weakening bond between young learners and the local culture that constitutes part of their social identity. Curricular adaptation that positions local wisdom as a resource for

digital literacy development has been identified as a strategic response to this tension in the Indonesian context (Asmayawati et al., 2024).

National literacy performance provides the empirical entry point for the problem. The 2022 Programme for International Student Assessment recorded reading, mathematics, and science performance of Indonesian students below the average of OECD member countries (OECD, 2023). Statistics on household telecommunication access indicate that internet penetration among school-age children has risen sharply across the last five years and exceeds sixty percent (Badan Pusat Statistik, 2024). The two datasets expose an imbalance between broad access to digital devices and the pedagogical optimisation of those devices for literacy that carries social and cultural substance. Literacy in the twenty-first century is no longer confined to decoding text, since it also encompasses cultural literacy as a foundation for identity formation and social awareness among young citizens (UNESCO, 2021).

Cultural literacy occupies a strategic position at the elementary level because it concerns the capacity of students to recognise, interpret, and appreciate the cultural values embedded in their surroundings. The construct extends beyond factual knowledge of traditions or artefacts and covers appreciative attitudes together with the ability to reflect cultural values in daily conduct (UNESCO, 2021). Empirical work at the elementary level demonstrates that science learning integrated with ethnoscience and culture produces measurable gains in cultural literacy alongside critical thinking (Atmojo et al., 2025). Case-based evidence from primary classrooms also shows that embedding local culture in social learning strengthens social awareness and responsible decision making, although reflective and intrapersonal dimensions remain underdeveloped (Niman, 2025). Policy direction is aligned with this orientation, since the Merdeka Curriculum situates cultural awareness and citizenship as dimensions of the graduate profile (Kemendikbudristek, 2022).

IPAS learning holds a strategic function in cultivating cultural literacy because the subject is designed to connect natural, social, and cultural concepts within an integrated instructional frame (Kemendikbudristek, 2022). Through IPAS, students are expected to interpret the relationship between human beings, the environment, and cultural practices that operate in community life. Classroom reality diverges from this design, since instruction remains dominated by generic national textbooks that provide minimal local enrichment, so that IPAS concepts are received as abstract propositions detached from lived experience. A decade-long synthesis of ethnoscience research confirms that culturally contextualised science learning improves scientific, environmental, and cultural literacy, while also revealing that the elementary level remains the least represented segment of the literature (Nur Hikmah et al., 2025). Learning models built on ethnoscience have been shown to develop critical thinking together with concern for local culture (Hikmawati et al., 2021), and local wisdom based media improve higher order reasoning in science classes (Mulatsih et al., 2023).

The gap becomes concrete within elementary schools of Gresik Regency. The region holds a distinctive coastal cultural repertoire that includes the Bandeng Market tradition, milkfish-based culinary practice, fishpond and salt economies, and coastal batik motifs that carry the social and economic identity of the community. These cultural assets remain productive in society, yet their conversion into IPAS learning resources has not been organised systematically. Teachers report constrained access to media capable of presenting local wisdom in a contextual and interactive format, even though Regional Regulation of Gresik Regency Number 7 of 2019 assigns educational institutions an explicit role in preserving and transmitting regional culture. Teaching resources built on local wisdom through structured design procedures have been reported to empower student attitudes toward their own cultural and natural environment in comparable Indonesian settings (Damopolii et al., 2024).

Interactive digital media grounded in local wisdom offer a defensible bridge between the demands of twenty-first century learning and the reinforcement of cultural identity. Multimedia learning theory explains that the coordinated presentation of verbal and pictorial representations reduces extraneous cognitive load and supports generative processing when the design matches learner characteristics (Mayer, 2021). Quasi-experimental evidence indicates that interactive multimedia raises curiosity and engagement in science classrooms (Herianto et al., 2022) and improves achievement in basic science across learners of varying ability (Adeyele, 2024). Contextual Teaching and Learning reinforces the argument by positioning the connection between subject matter and the real experience of learners as the condition for meaningful and reflective learning (Johnson, 2014). Media development that ignores the empirical needs of the field risks producing artefacts that are technologically advanced yet pedagogically irrelevant, which is why systematic needs analysis precedes any design decision (Branch & Kopcha, 2019; Nafiah & Wuryandani, 2024).

Existing studies on local wisdom based media concentrate on secondary science, on printed or modular formats, and on the effectiveness testing of finished products. Empirical mapping of the needs that precede the development of interactive digital media for elementary IPAS, with cultural literacy as the targeted outcome and a coastal cultural setting as the context, remains scarce. The present study addresses that gap by analysing the needs for interactive digital media based on local wisdom to strengthen cultural literacy in elementary school IPAS learning. Three questions guide the inquiry. The first concerns the level and the distribution of the perceived need for such media. The second concerns the priority aspects that must be accommodated in the design. The third concerns the current condition of IPAS learning, teacher readiness, and the potential of Gresik local wisdom as a learning context. The findings supply the conceptual and empirical foundation for the design of BESTARI interactive digital media.

RESEARCH METHOD

This study applied a needs analysis design that combines a quantitative descriptive strand with a qualitative strand within a single investigation. The quantitative strand measured the level and the priority structure of the perceived need for interactive digital media, while the qualitative strand explained the instructional conditions, teacher readiness, and cultural potential that underlie those numbers. The qualitative component follows the logic of contextual and holistic inquiry into educational phenomena in natural settings (Creswell & Poth, 2018). Needs analysis constitutes the analytical stage that precedes design and development, since it establishes the empirical basis for every subsequent design decision (Branch & Kopcha, 2019). The procedural flow of the study is presented in Figure 1.

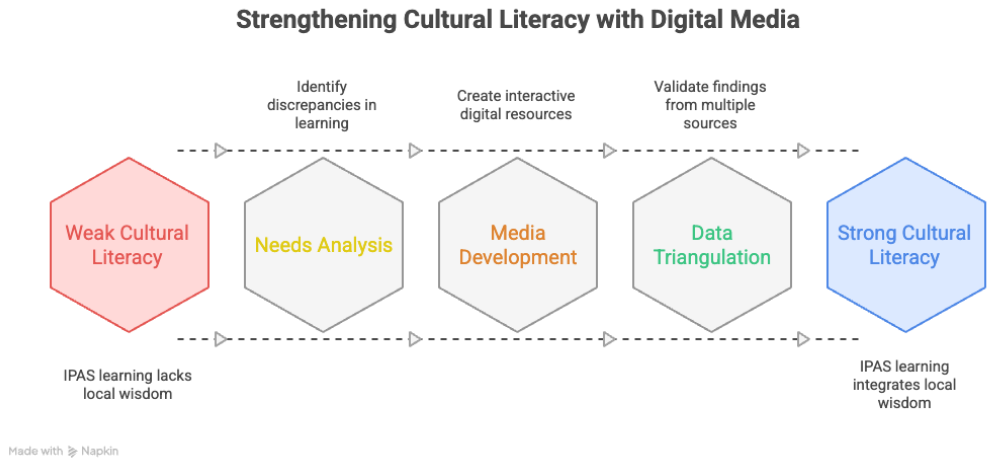

Figure 1. Research Procedure of the Needs Analysis

The research was conducted at a public elementary school in Gresik Regency that implements the Merdeka Curriculum in IPAS learning. Respondents consisted of upper-grade teachers who teach IPAS together with upper-grade students at the school (n = ____). Participant selection was purposive, guided by the direct involvement of teachers in planning and enacting IPAS lessons, their familiarity with student characteristics, and their knowledge of the coastal socio-cultural setting of the school (Etikan, 2016). Teachers with at least three years of experience in teaching IPAS in upper grades were prioritised in order to secure informants capable of articulating instructional constraints with sufficient depth.

Four instruments supported data collection. A needs questionnaire elicited perceptions of the urgency of interactive digital media and the priority of five design aspects, namely integration of local culture and traditions, interactive visual elements, contextual examples from the local environment, ease of use and accessibility, and alignment with IPAS curriculum objectives. A semi-structured interview guide explored IPAS instructional practice, patterns of media use, and teacher perspectives on integrating local wisdom. An observation sheet captured classroom conditions during IPAS lessons. A document study checklist covered teaching modules, learning outcome documents, and regional cultural policy. Instrument content was reviewed by two lecturers in elementary education technology before deployment.

Quantitative data were analysed with descriptive statistics. Measures of central tendency, namely mode, median, and mean, together with measures of dispersion, namely standard deviation and variance, described the level and the homogeneity of the perceived need. The priority of each design aspect was expressed as an achievement percentage and classified through an interpretive criterion in which a score of at least 85% is categorised as very high, a score between 70% and 84.9% as high, a score between 55% and 69.9% as moderate, and a score below 55% as low. Qualitative data were analysed through data condensation, data display, and conclusion drawing with continuous verification against the theoretical frame and prior empirical findings (Miles et al., 2020).

Credibility was maintained through source triangulation and technique triangulation. Source triangulation compared information obtained from teachers, students, and institutional documents, whereas technique triangulation compared questionnaire results, interview transcripts, observation notes, and documentary evidence. Coding decisions were audited by a second researcher, and interpretive summaries were returned to participating teachers for confirmation. This procedure satisfies the established criteria of trustworthiness in qualitative inquiry, which require credibility, dependability,

confirmability, and transferability to be demonstrated through documented analytic steps (Nowell et al., 2017).

RESEARCH RESULTS AND DISCUSSION

Research Results

The analysis is organised into four parts. The first part reports the general level of the perceived need. The second part reports the priority structure of the design aspects. The third part presents the orientation of the media needs. The fourth part summarises the qualitative findings that explain the quantitative pattern.

Descriptive Statistics of the Media Needs Analysis

Descriptive analysis identified the general tendency of respondent perceptions toward the need for interactive digital media that integrate local wisdom. The computation covered measures of central tendency and dispersion, and the results are displayed in Table 1.

Table 1. Descriptive Statistics of the Perceived Need for Interactive Digital Media

No.	Descriptive Measure	Value
1	Mode	6.56
2	Median	6.78
3	Mean	6.85
4	Standard deviation	1.20
5	Variance	1.44

Source: Processed primary data

The mean of 6.85 indicates that respondents perceive a high level of need for interactive digital media grounded in local wisdom. A standard deviation of 1.20 with a variance of 1.44 yields a coefficient of variation of 17.5%, which places respondent perceptions within a homogeneous band and signals a shared assessment of urgency rather than a polarised one. The ordering of mode, median, and mean produces a Pearson skewness coefficient of 0.18, so the distribution approaches symmetry with only a marginal positive skew. The convergence of the three measures of central tendency strengthens confidence in the stability of the response pattern and supports the inference that the need operates as a collective condition of the classroom rather than an individual preference.

Priority Needs for Interactive Digital Media Development

Further analysis identified the aspects that must receive priority in the design of interactive digital media for IPAS learning. The analysis addressed three dimensions, namely content relevance, media features, and integration of local wisdom, which were operationalised into five measurable aspects presented in Table 2.

Table 2. Priority Needs for the Development of Interactive Digital Media

No.	Needs Aspect	Percentage (%)	Category
1	Integration of local culture and traditions	87.5	Very high
2	Interactive visual elements (animation, images)	85.2	Very high
3	Contextual examples from the students' local environment	82.6	High
4	Ease of use and accessibility	80.4	High
5	Alignment with IPAS curriculum objectives	78.9	High

Source: Processed primary data

Integration of local culture and traditions emerged as the dominant need at 87.5% and falls within the very high category, followed by interactive visual elements at 85.2%, which also reaches the very high category. Contextual examples drawn from the local environment reached 82.6%, ease of use and accessibility reached 80.4%, and alignment with IPAS curriculum objectives reached 78.9%, with all three located in the high category.

The spread between the highest and the lowest aspect is 8.6 percentage points, which indicates that respondents treat every aspect as necessary while assigning a clear ranking. The pattern positions cultural substance and interactivity as the two design pillars, whereas curricular alignment operates as a baseline requirement that the media are expected to satisfy by default.

Orientation of the Media Needs

The orientation of respondent perceptions toward interactive digital media needs is summarised in the visual representation presented in Figure 2, which maps the relative weight of each aspect against the cultural literacy target.

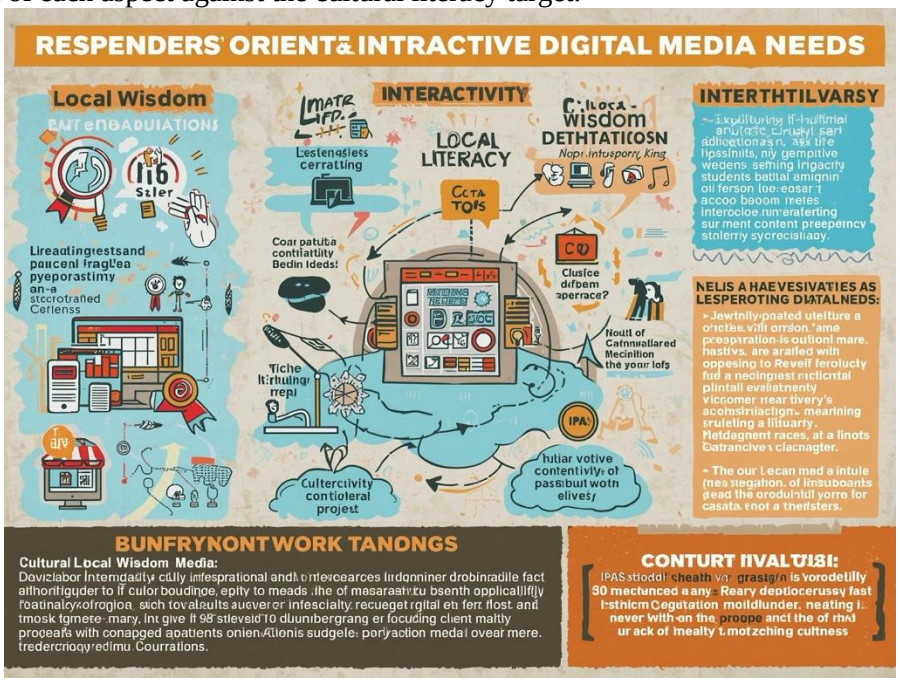

Figure 2. Orientation of Interactive Digital Media Needs Based on Local Wisdom

Source: Processed primary data

Figure 2 demonstrates that cultural relevance and interactivity function as inseparable elements in the reinforcement of cultural literacy. Media development for IPAS learning cannot be reduced to technological sophistication, since respondents attach greater weight to cultural meaning rooted in the everyday environment of the learners. The configuration confirms that technological features acquire pedagogical value only when they carry culturally significant content.

Qualitative Findings

Interviews, observation, and document study produced three convergent findings. IPAS instruction proceeds linearly from the national textbook, with limited insertion of local social and cultural material. Teachers acknowledge the motivational value of digital media yet identify limited technical competence, restricted instructional time, and the pressure of curriculum coverage as the principal obstacles to producing culturally contextualised media independently. Document study of regional cultural policy and school teaching modules confirms that the coastal cultural repertoire of Gresik is available and relevant to IPAS content, yet remains unconverted into structured learning resources. These qualitative findings explain the quantitative pattern reported in Table 1 and Table 2 and establish the empirical ground for the conceptual design that follows.

Discussion

Dynamics of IPAS Learning and the Limits of Cultural Contextualisation

Instruction in the observed classrooms remains oriented toward the delivery of textbook content. Teachers treat the national textbook as the primary and most accessible resource because it guarantees curricular alignment, and this dependence narrows the space for the insertion of local social and cultural material. IPAS concepts that should stand close to the everyday life of learners are consequently received as abstract material with weak experiential anchoring. Teachers presented material in a linear sequence while students occupied the position of recipients, and opportunities to relate IPAS content to community economic activity, coastal traditions, or local environmental conditions remained rare. Instructional time and the obligation to complete curricular targets were named as the principal constraints, which exposes a distance between the integrative ideal of IPAS and a classroom practice still governed by cognitive coverage.

This condition confirms that the potential of IPAS as a vehicle for cultural literacy has not been realised. Synthesised evidence across a decade of ethnoscience research demonstrates that science learning contextualised with local culture strengthens scientific, environmental, and cultural literacy, while also revealing that elementary classrooms remain the least served level of implementation (Nur Hikmah et al., 2025). Experimental evidence at the elementary level reinforces the argument, since ethnoscience integrated science learning produced significantly higher cultural literacy and critical thinking scores than conventional instruction (Atmojo et al., 2025). Instruction that severs IPAS content from the cultural environment of the learner reduces both the relevance and the meaning of the learning process, and the present findings reproduce that mechanism in a coastal elementary setting.

Teacher Perceptions of Digital Media and the Challenges of Implementation

Teachers regard digital media as a productive instrument for raising engagement in IPAS learning, and they observe stronger enthusiasm when lessons employ visuals, animation, and interactive activity. The media currently in use are nevertheless generic and were not designed to foreground local cultural context, so their function stops at attracting attention rather than building contextual understanding or reinforcing cultural literacy. Teachers also report limited technical competence for developing digital media independently, and they describe culturally grounded media production as an activity that demands time, skill, and resources that are not consistently available. The practical consequence is a reliance on ready-made media whose content does not correspond to the environment of the students.

The evidence indicates that teacher needs extend beyond the availability of digital media toward media that are operable, culturally relevant, and matched to learner characteristics. Multimedia learning theory clarifies the mechanism, since instructional media become meaningful when their design corresponds to the cognitive architecture and prior knowledge of the learner (Mayer, 2021). Empirical work supports the proposition at scale, because interactive multimedia raised curiosity in science classrooms (Herianto et al., 2022) and improved basic science achievement across ability levels (Adeyele, 2024). Needs analysis conducted with elementary teachers on interactive flipbook materials reported an identical configuration, in which teachers demanded practicality and contextual fit rather than additional technological complexity (Nafiah & Wuryandani, 2024). Interactive multimedia based e-modules have similarly been associated with favourable student responses and learning outcomes in elementary schools (Alyusfitri et al., 2024). The demand for interactive digital media rooted in local wisdom operates as a genuine pedagogical need rather than a technological preference.

Gresik Local Wisdom within the Perspective of Cultural Literacy

Document study established that Gresik Regency holds a repertoire of local wisdom directly relevant to IPAS content. The Bandeng Market tradition, fishing and aquaculture activity, coastal culinary practice, and the social dynamics of coastal

communities articulate the interconnection between the natural environment, economic activity, and cultural values. This repertoire can operate as a learning context that renders IPAS concepts concrete, since the relationship between water quality, tidal cycles, food production, and community livelihood is observable in the immediate surroundings of the school. Regional Regulation of Gresik Regency Number 7 of 2019 supplies the policy mandate that legitimises the use of these cultural assets within formal instruction.

Local wisdom deployed as a learning context does more than illustrate subject matter, because it functions as an instrument for cultivating cultural literacy. Instruction that foregrounds local culture enables students to recognise their cultural identity and to develop an appreciative disposition toward their social environment, which corresponds with the position that culture-based education shapes awareness and identity among young citizens (UNESCO, 2021). Case-based evidence from primary classrooms shows that the integration of local culture strengthens social awareness, relationship skills, and responsible decision making, while reflective self-awareness requires deliberate instructional design (Niman, 2025). Learning models built on ethnoscience have produced concern for local culture alongside critical thinking (Hikmawati et al., 2021), and teaching materials that embed local wisdom within problem-based structures have empowered student attitudes toward their cultural and natural environment (Damopolii et al., 2024). Interpreting Gresik local wisdom within IPAS learning consequently positions the subject as a space for the internalisation of cultural values and for critical reasoning about the relationship between human beings, environment, and culture.

The Position of BESTARI Interactive Digital Media as a Conceptual Solution

The aggregate findings indicate that the core problem of IPAS learning is not the availability of media but the relevance of the media to the social and cultural context of the learner. BESTARI interactive digital media is positioned as a conceptual solution designed to close that gap. The media present IPAS content through the visualisation of local culture, exploratory activity, and reflective prompts that require students to connect scientific concepts with the cultural realities they inhabit. The architecture of the media follows the priority structure reported in Table 2, so that cultural integration and interactivity occupy the design core while curricular alignment and operability function as necessary conditions.

Conceptually the design is anchored in Contextual Teaching and Learning, which stipulates that learning acquires meaning when subject matter is connected to the authentic experience of the learner (Johnson, 2014). Multimedia learning theory supplies the second anchor by specifying how the coordination of pictorial and verbal channels supports generative processing when the design respects learner characteristics (Mayer, 2021). BESTARI has not undergone empirical testing within this study, and it is presented as a design proposition derived from the needs analysis rather than as a validated product. Within this frame the media constitute a pedagogical approach grounded in field evidence rather than a technical artefact introduced for its own sake.

The wider implication concerns the model of media development for elementary schools. BESTARI demonstrates that the reinforcement of cultural literacy can be embedded systematically within IPAS learning without compromising the learning outcomes prescribed by the curriculum, a proposition consistent with evidence that culturally grounded science instruction raises literacy outcomes while preserving conceptual mastery (Atmojo et al., 2025; Mulatsih et al., 2023). Curricular adaptation that treats local wisdom as a resource for digital literacy development has been shown to support sustainable educational practice in the Indonesian context (Asmayawati et al., 2024). The findings open a research pathway toward development research and controlled trials that examine the effectiveness of BESTARI, together with replication in other regional cultural contexts.

CONCLUSION

The needs analysis establishes that IPAS learning in the observed elementary school still operates with limited contextual digital media oriented toward the reinforcement of cultural literacy. Instruction relies on generic learning resources that do not connect IPAS concepts with the social and cultural realities surrounding the learners, which produces a measurable distance between the demands of twenty-first century learning and the practice enacted in the classroom.

Quantitative evidence places the perceived need at a mean of 6.85 with a standard deviation of 1.20 and a coefficient of variation of 17.5%, which describes a high and homogeneous need. Integration of local culture and traditions holds the highest priority at 87.5%, followed by interactive visual elements at 85.2% and contextual examples from the local environment at 82.6%. Teachers require media that are operable, aligned with student characteristics, and capable of carrying local wisdom as a learning context. The coastal cultural repertoire of Gresik is confirmed as relevant material for IPAS learning and as a vehicle for cultivating appreciation of local culture from the elementary level onward.

BESTARI interactive digital media is positioned as the conceptual solution derived from these findings. The media integrate IPAS content, visualisation of local culture, and interactive activity that supports cultural literacy. The study stops at the analytical stage and does not extend to development or effectiveness testing, and the single-site scope limits generalisation. These limitations mark the boundary of the claims advanced here while establishing the conceptual foundation for the subsequent design, development, and validation of contextual IPAS learning media.

SUGGESTIONS/RECOMMENDATIONS

Developers of elementary IPAS learning media are advised to treat the integration of local wisdom as a core design component rather than a decorative supplement, since cultural integration registered the highest priority in the needs structure. Teachers and schools are encouraged to convert local traditions, community economic practice, and the everyday experience of students into structured digital learning resources, supported by professional development that strengthens technical capacity in media production. Subsequent research should advance the BESTARI prototype into the development and evaluation stages through design and development research followed by experimental or quasi-experimental testing, with cultural literacy, conceptual mastery, and learner engagement as measured outcomes across diverse elementary school settings.

REFERENCES

Adeyele, V. O. (2024). Relative effectiveness of simulation games, blended learning, and interactive multimedia in basic science achievement of varying ability pupils. *Education and Information Technologies, 29*(11), 14451–14470. https://doi.org/10.1007/s10639-023-12414-z

Alyusfitri, R., Gistituati, N., Yerizon, Fauzan, A., & Yarman. (2024). The effectiveness and relationship of student responses toward learning outcomes using interactive multimedia-based e-modules in elementary schools. *International Electronic Journal of Elementary Education, 16*(5), 573–584. https://doi.org/10.26822/iejee.2024.354

Asmayawati, Yufiarti, & Yetti, E. (2024). Pedagogical innovation and curricular adaptation in enhancing digital literacy: A local wisdom approach for sustainable development in Indonesia context. *Journal of Open Innovation: Technology, Market, and Complexity, 10*(1), 100233. https://doi.org/10.1016/j.joitmc.2024.100233

Atmojo, S. E., Anggriani, M. D., Rahmawati, R. D., Skotnicka, M., Wardana, A. K., & Anindya, A. P. (2025). Bridging STEM and culture: The role of ethnoscience in developing critical thinking and cultural literacy. *Jurnal Pendidikan IPA Indonesia, 14*(2), 251–266. https://doi.org/10.15294/jpii.v14i2.23505

Badan Pusat Statistik. (2024). *Statistik telekomunikasi Indonesia 2024*. Badan Pusat Statistik.

Branch, R. M., & Kopcha, T. J. (2019). Instructional design models. In R. A. Reiser & J. V. Dempsey (Eds.), *Trends and issues in instructional design and technology* (4th ed., pp. 77–87). Pearson.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.

Damopolii, I., Nunaki, J. H., Jeni, J., Rampheri, M. B., & Ambusaidi, A. (2024). An integration of local wisdom into a problem-based student book to empower students' conservation attitudes. *Participatory Educational Research, 11*(1), 158–177. https://doi.org/10.17275/per.24.10.11.1

Etikan, I. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics, 5*(1), 1–4. https://doi.org/10.11648/j.ajtas.20160501.11

Herianto, Wilujeng, I., & Lestari, D. P. (2022). Effect of interactive multimedia e-books on lower-secondary school students' curiosity in a science course. *Education and Information Technologies, 27*(7), 9619–9639. https://doi.org/10.1007/s10639-022-11005-8

Hikmawati, H., Suastra, I. W., & Pujani, N. M. (2021). Ethnoscience-based science learning model to develop critical thinking ability and local cultural concern for junior high school students in Lombok. *Jurnal Penelitian Pendidikan IPA, 7*(1), 60–66. https://doi.org/10.29303/jppipa.v7i1.530

Johnson, E. B. (2014). *Contextual teaching and learning: What it is and why it's here to stay*. Corwin Press.

Kemendikbudristek. (2022). *Capaian pembelajaran IPAS sekolah dasar dalam Kurikulum Merdeka*. Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Republik Indonesia.

Mayer, R. E. (2021). *Multimedia learning* (3rd ed.). Cambridge University Press. https://doi.org/10.1017/9781316941355

McCrindle, M. (2019). *Generation Alpha: Understanding our children and helping them thrive*. McCrindle Research.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2020). *Qualitative data analysis: A methods sourcebook* (4th ed.). SAGE Publications.

Mulatsih, D., Yamtinah, S., & Matsuri, M. (2023). Use of local wisdom-based media to improve critical thinking. *Jurnal Penelitian Pendidikan IPA, 9*(10), 7987–7992. https://doi.org/10.29303/jppipa.v9i10.3989

Nafiah, N., & Wuryandani, W. (2024). Analysis of teacher needs in developing flipbook-based interactive teaching materials in elementary schools. *QALAMUNA: Jurnal Pendidikan, Sosial, dan Agama, 16*(2), 903–918. https://doi.org/10.37680/qalamuna.v16i2.5071

Niman, E. M. (2025). Embedding local culture in social studies: Pathways to strengthen social-emotional learning in primary education. *Frontiers in Education, 10*, 1655528. https://doi.org/10.3389/feduc.2025.1655528

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods, 16*(1), 1–13. https://doi.org/10.1177/1609406917733847

Nur Hikmah, Yohandri, Arsih, F., Azhar, M., & Razak, A. (2025). Uncovering the potential of ethnoscience in science learning to improve students' literacy: A systematic literature review (2014–2024). *Jurnal Pendidikan IPA Indonesia, 14*(3), 550–562. https://doi.org/10.15294/jpii.v14i3.19591

OECD. (2023). *PISA 2022 results (Volume I): The state of learning and equity in education*. OECD Publishing. https://doi.org/10.1787/53f23881-en

UNESCO. (2021). *Reimagining our futures together: A new social contract for education*. UNESCO Publishing.