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Validity of Digital Media Filled with Local Wisdom of Industrial Agriculture in Improving Student's Self-Regulation and Digital Literacy

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Local wisdom
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Abstract

This research aimed to analyze aspects of the validity of digital media containing local wisdom of industrial agriculture that has been developed. The research method used is the R and D (Research and Development) research method with the Four-D development model (Define, Design, Develop, Disseminate). The stages of this research design were modified, namely, only up to step three. This is because the focus of this research aims to produce an initial module and has yet to be disseminated. At the 4D development stage, in the Develop section, three media and material experts carried out media development and validation activities. The data collection technique uses a validation questionnaire—data analysis technique using descriptive analysis. The validation results for each aspect, namely construct validation of 89.08%, content validation of 90%, and Language validation of 86.67%, these three aspects are in the very good category. The results of the overall validation show that digital media based on local wisdom of industrial agriculture achieves a validity score of 88.58%, which is in the very good category and is suitable for use. Thus, it can be concluded that digital media containing local wisdom of industrial agriculture can be used to learn physics in introductory physics one course as an alternative solution to innovative learning resources based on local wisdom.

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1. INTRODUCTION

Students are part of the community whose knowledge can be based on the industrial and agricultural environment, which is students' initial knowledge when participating in physics lessons. Many factors can affect the process and results of education, including student factors, lecturer

factors, and environmental factors (Handayani, 2019). Environmental factors can be in the form of educational institutions and neighborhoods. Learning strategies based on environmental phenomena where students live are suitable for developing students' self-regulation learning abilities and digital literacy.

The learning strategy developed in the study used the Team-Based Project – Hybrid Learning (TBPHL) strategy. This active learning method combines online and face-to-face learning through small groups inside and outside the classroom. Jean Piaget's learning theory states that students already have prior knowledge before studying at institutions—students learn to build their knowledge (Rahman & Rahman, 2019). Jerome Brunner's learning theory states that optimal learning uses inquiry or discovery because by discovering it yourself, students' knowledge lasts longer (Gusmardin et al., 2019). David Ausubel's theory states that learning can be meaningful if there is a match between the knowledge provided by educators following student conceptions (Istiadah, 2020). In order to support learning strategies to be more effective, learning media relevant to the development of communication technology, namely digital media, is needed. Digital media contains combined information from various forms of content, namely data, text, sound, and images stored in digital formats, which are disseminated via the Internet. Forms of digital media include social media, websites, digital photos, digital audio, digital videos, digital modules, and e-books (Muhasim, 2017).

Digital media has an essential role in learning. The research results of Panjaitan, N. Q., Yetti, E., & Nurani, Y. (2020) state that digital media and self-confidence can improve student learning outcomes. Furthermore, the research results of Muali, C. (2022) state that learning using mobile augmented reality and self-regulation can improve students' conceptual understanding, metacognition, and digital literacy. Based on this description, digital media, self-regulation, and digital literacy are essential and interrelated components. Therefore, it needs to be studied further. Another important thing is that mastery of digital technology can be used as essential capital to face the demands of 21st-century technological developments. Based on this description, the Team-Based Project – Hybrid Learning (TBPHL) learning strategy based on local wisdom of industrial agriculture with digital media can improve the quality of the learning process because it can provide opportunities for students to explore and develop self-regulation learning and digital literacy.

Self regulation is a learning process which is influenced by one's ability to regulate oneself while studying. With self-regulation, students can monitor their success during the learning process and increase learning motivation when they feel the learning methods used are successful. When self-regulation is not going well, students tend to delay time in completing assignments and are less focused in completing these assignments (Siregar and Siregar, 2021). Literasi digital adalah salah satu kemampuan yang penting bagi mahasiswa untuk mempersiapkan diri menghadapi revolusi industri 4.0. Dikarenakan perkembangan Teknologi Informasi dan Komunikasi (TIK) yang pesat, kemampuan literasi digital, informasi, dan teknologi menjadi sama pentingnya dengan kemampuan umum yang lainnya. Mahasiswa yang memiliki kemampuan literasi digital yang baik akan berusaha mencari dan memilih informasi yang relevan serta memahami, berkomunikasi, dan mengungkapkan gagasan-gagasan mereka di dunia digital. Dengan demikian, kemampuan literasi digital membuka peluang bagi mahasiswa untuk berpikir, berkomunikasi, dan berprestasi dalam proses belajar yang pada akhirnya dapat mengarah pada kesuksesan (Dinata, 2021).

The urgency of research on the Team-Based Project – Hybrid Learning (TBPHL) strategy based on local wisdom of industrial agriculture by utilizing the community environment. The industrial, agricultural environment is tasked with doing projects using digital media such as e-modules, e-books, and animated videos to accommodate students' initial knowledge from the industrial, agricultural community environment with TBPHL so that it can strengthen the learning process by adapting student physics concepts. They are learning to support the achievement of RIPP University of Jember.

2. METHOD

The research method used is R and D (Research and Development) with the Four-D development model (Define, Design, Develop, Desiminate). The stages of this research design were modified, namely, only up to step three. This is because the focus of this research aims to produce digital module designs that have been validated and have yet to be disseminated. At the 4D development stage, in the Develop section, three media and material experts carried out media development and validation activities. The digital media created uses Articulate Storyline 3 software. This digital media contains material about studying the physical concepts of temperature and heat, videos about the coffee processing process from several places, and video documentation of travel during research, which is educational for students. The data collection technique uses a validation questionnaire. The data analysis technique uses descriptive analysis to examine the validity score and its validity level. The validity criterion is carried out by matching the results of the average percentage of the total validity score, as shown in Table 1.

Table 1. Eligibility Criteria Results of Validity Analysis

Presents	Validity criteria
$75\% < p \leq 100\%$	Very good
$50\% < p \leq 75\%$	Enough
$25\% < p \leq 50\%$	Not good
$0\% \leq p \leq 25\%$	Not very good

(Sugiyono, 2020)

3. RESULTS AND DISCUSSION

The local wisdom-based digital media being developed accommodates local wisdom phenomena as a basis for the approach. The results of this digital media are used in learning at the student level. This research was conducted in June and July 2023. The steps for developing digital media include defining, designing, and developing.

In the define stage, the researcher analyzed the curriculum and learning outcomes in the Basic Physics 1 course. The research began by reviewing the curriculum in the Fundamental Physics 1 course and the physics concepts that would be discussed. At this stage, it is known that the concepts of temperature and heat can be more contextually linked to the local wisdom of Jember and its surroundings, namely the coffee processing process. The material temperature and heat were chosen because they are closely related to everyday life. The use of temperature and heat is very much found, including cooking and coffee processing, which utilizes temperature and heat. Apart from that, learning outcomes in temperature and heat material need to be improved by adding material content that is interesting and contextually close to students who are in an industrial agricultural environment. So, at this stage, observations of coffee processing have also been carried out in several places promoting coffee education and tourism. Furthermore, research observations were conducted at the Gucialit Lumajang Coffee Bale, Kalibendo Banyuwangi Coffee Plantation, Kahyangan Gunung Pasang Jember Coffee Plantation, and Kluncing Bondowoso Coffee Plantation.

At the design stage, researchers conduct activities to design what components must be included in this media. The physics concepts were analyzed Based on the observations related to coffee processing. Physics in coffee processing is a matter of temperature and heat. This module has an opening page, an initial page containing menus on this digital media, a course learning outcomes page, a material page related to the physical concepts of temperature and heat, and a page about the video display of coffee and cocoa processing and the preparation team. The process of designing digital media uses Canva software and Articulate Storyline 3.

Researchers carried out the digital media development process and validation activities at the development stage with experts. Meanwhile, the dissemination stage was not carried out because the discussion of the results of this research only focused on the results of digital media development. Furthermore, developing learning media in digital media based on local wisdom of industrial agriculture will be implemented for students in the fundamental physics 1 course at the University of Jember. This digital media consists of a front page, a collection of material (text and video), posttest questions, and the drafting team. The results of media development are displayed in Figure 1.


SUHU & KALOR
Materi Kearifan Lokal Pengolahan Kopi
Masukan Nama
Melisa Putri F
Mulai

A


Melisa Putri F
SUHU & KALOR
Materi Kearifan Lokal Pengolahan Kopi
PENDAHULUAN
KOMPETENSI
MATERI
QUIZ
PROFIL

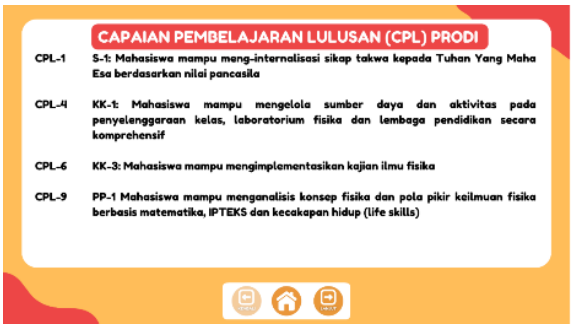
B


PENGENALAN TOMBOL DASAR
KEMBALI
LANJUT
Tombol Back diklik. Pengguna akan kembali ke halaman sebelumnya untuk memeriksa kembali konsep atau inormasi yang mungkin perlu dipahami ulang.

C


Halo! Saya Kak Nala dan Kak Ray mentormu dalam suhu & kalor kopi. Bersama kami, kita akan mengungkap rahasia di balik setiap tegukan kopi yang kamu buat. Siap menjelajah dunia kopi bersama kami? Ayo, kita mulai petualangan kopi yang penuh suhu & kalor ini!

d


CAPAIAN PEMBELAJARAN LULUSAN (CPL) PRODI
CPL-1 S-1: Mahasiswa mampu meng-internalisasi sikap takwa kepada Tuhan Yang Maha Esa berdasarkan nilai pancasila
CPL-4 KK-1: Mahasiswa mampu mengelola sumber daya dan aktivitas pada penyelenggaraan kelas, laboratorium fisika dan lembaga pendidikan secara komprehensif
CPL-6 KK-3: Mahasiswa mampu mengimplementasikan kajian ilmu fisika
CPL-9 PP-1 Mahasiswa mampu menganalisis konsep fisika dan pola pikir keilmuan fisika berbasis matematika, IPTEKS dan kecakapan hidup (life skills)

E


SUHU & KALOR
Materi Kearifan Lokal Pengolahan Kopi
SUHU
KALOR
PENGOLAHAN KOPI

f


Suhu adalah besaran yang menyatakan derajat panas atau dingin

G


KALOR
Kalor adalah energi yang berpindah dari benda yang bersuhu tinggi ke benda yang bersuhu rendah. Ini disebabkan oleh perbedaan suhu antara dua benda.

h


Pengolahan biji kopi sendiri merupakan salah satu contoh penerapan konsep suhu dan kalor dalam kehidupan sehari-hari. Pemrosesan kopi sebelum dapat diminum melalui proses panjang yaitu dari pemanenan biji kopi sampai menjadi minuman kopi yang siap diminum.
HOT
Coffee

I


Pada pengeringan biji kopi, panas dikenduksikan untuk menghilangkan kelembaban. Biji kopi ditempatkan di permukaan panas atau drum pemanggang, memungkinkan panas tersebut meresap ke dalam biji kopi. Proses ini penting untuk menjaga kualitas biji kopi sebelum diproses lebih lanjut.
Jemur
Pemanggangan

j


PEMUAIAN BIJI KOPI
Pada pemanggangan biji kopi, suhu tinggi menyebabkan pemuaian biji kopi. Pemuaian ini penting untuk pemanggangan yang merata dan pengembangan rasa dan aroma yang diinginkan. Selain itu, pemuaian juga mempengaruhi kepadatan dan struktur biji kopi yang sudah dipanggang.

K


TIM PENYUSUN
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Drs. Subiki, M.Kes., M.C.E.
Drs. Alex Harijanto, M.Si., M.C.E.
Drs. Maryani M.Pd., M.C.E

l


TIM PENYUSUN
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Melisa Putri Febriyanti
200210102007
Nurul Faradillah
200210102029
Nadiah Putri Anggraeni
200210102042
Pria Nur Wulandari
200210102099

M


Video Pengolahan Kopi
Gucialit Lumajang
Gunung Pasang Jember
Ijen Geopark Bondowoso
Kalibendo Banyuwangi

n


Pengolahan Kopi "Bale Kopi Gucialit"
GUCIALIT
Coffee and Roastery

O


Pengolahan Kopi "Perkebunan Kalibendo"
1911

p


Pengolahan Kopi "Ijen Geopark"
IJEN GEOPARK
BONDOWOSO

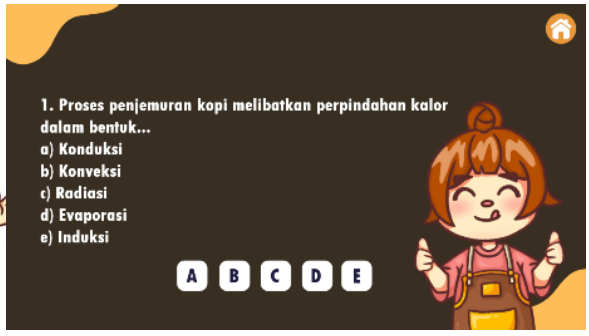
Q


Pengolahan Kopi "Perkebunan Gunung Pasang"

r


SUHU & KALOR
Materi Kearifan Lokal Pengolahan Kopi
Mulai

S


1. Proses penjemuran kopi melibatkan perpindahan kalor dalam bentuk...
a) Konduksi
b) Konveksi
c) Radiasi
d) Evaporasi
e) Induksi
A B C D E

t

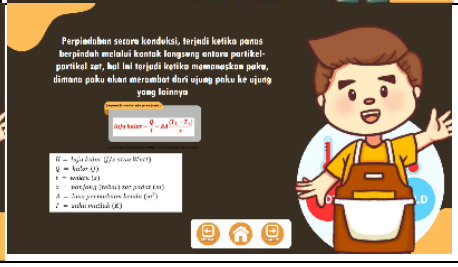
U

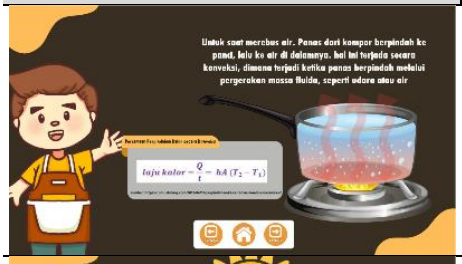
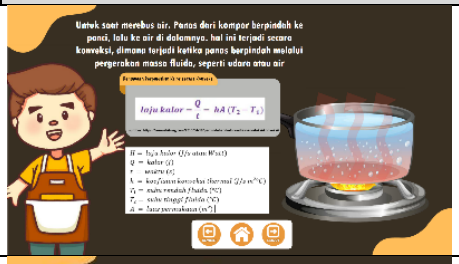
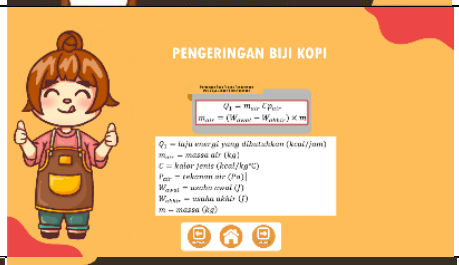
Figure 1. Digital Media Display

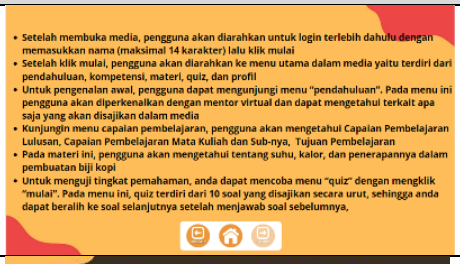
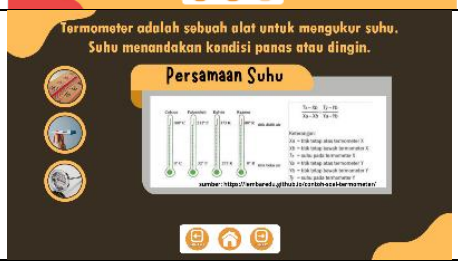
Figure 1a is an initial view of digital media. Figure 1b displays the digital media main menu. Figure 1c is a primary button recognition display. Figure 1d is an introductory view. Figure 1e displays the graduate learning achievement (CPL) menu for study programs. Figure 1f is a menu of material choices from digital media. Figure 1g is a menu of temperature material. Figure 1h is a menu of caloric materials. Figure 1i is an introduction to the coffee processing menu. Figure 1j is the coffee processing material in the drying stage. Figure 1k is a coffee processing material in the expansion stage. Figures 1l and 1m are a team of digital media compiling local industrial agriculture content. Figure 1n is a menu option for the coffee processing video. Figure 1o displays a video of the coffee processing process at Bale Kopi Gucialit, Lumajang. Figure 1p displays a video of the coffee processing process at the Kalibendo Plantation, Banyuwangi. Figure 1q displays a video of the coffee processing process at Ijen Geopark, Bondowoso. Figure 1r is a video of the coffee processing process at Gunung Pasang Plantation, Jember. Figure 1 is an initial display for the temperature and heat material quiz. Figure 1t is one of the quiz questions. Students can choose the available answers after choosing the answer it will look right or wrong from the selected answer. Figure 1u displays the temperature and heat quiz scores in digital media of local wisdom of industrial agriculture.

The digital media that has been developed is then validated by three media and material experts. The three validators are lecturers in the Physics Education study program. There have been several revisions to the validator's assessment. The results before and after the revision are shown in Table 2.

Table 2 Revised results of the validator's assessment

Before	After	Explanation
		Changing the basic questions according to the content of learning media content
		Added description of the conduction equation

Before	After	Explanation
		Added description of the convection equation
		Added description of the radiation equation
		Adding an explanation of the equation on the coffee bean drying process
		Adding an explanation of the equation in the coffee bean roasting process
		Correction of inaccurate sentences
		Improved sequence from radiation-convection-conduction to conduction-convection-radiation
		Added instructions for use

Before	After	Explanation
		
		Clarifying the image of the equation in measuring temperature using a thermometer

The validation results by the validator showed that the constructed aspect was 89.08% (very good), the content aspect was 90,00% (very good) and the language aspect was 86.67% (very good). The average validity for all aspects, namely 88.58%, is very good and valid so that it can be used in the physics learning process. The validation results are shown in Table 3.

Table 3. Results of digital medial validation based on local wisdom of industrial agriculture

	Contact	**Validator 1**	**Validator 2**	**Validator 3**
No.	Assessment criteria	Score	Score	Score
1.	Compatibility of digital media content with graduate learning outcomes (CPL)	4	4	4
2.	Suitability of digital media content with course learning outcomes (CPMK)	5	4	4
3.	The suitability of the content of the material contained in digital media with the level of student development	5	5	5
4.	Clarity of instructions and directions for activities presented coherently and transparently so as not to cause errors in carrying out activities	4	5	3
5.	Presentation of material is interactive and participatory (in learning to invite students to be active)	5	5	5
6.	Appropriateness of the difficulty level of the material with student development	5	4	5
7.	Conformity of sentences with the level of development of students	4	4	4
8.	Material truth from the aspect of science	4	5	4
9.	Learning media is equipped with basic questions (problems) that direct students to determine basic concepts	5	4	3
10.	The suitability of the contents of the practice questions with the material	5	4	5
11.	Type and size of letters according to the level of student development	4	5	4
	Score total	50	51	46

	Maximum Score	55	55	55
	Persentase	90.91%	92.72%	83.64%

	Content	**Validator 1**	**Validator 2**	**Validator 3**
No	Assessment criteria	Score	Score	Score
12.	Digital media that is applied to learning using the Strategy Team Based Project-Hybrid Learning (TBPHL) Loaded with Local Wisdom of Industrial Agriculture to Improve Student Self-Regulation and Digital Literacy is something new	5	5	4
13.	Digital media used in implementing the Team-Based Project-Hybrid Learning (TBPHL) Strategy Loaded with Local Wisdom of Industrial Agriculture to be able to train students' digital literacy skills	5	4	4
14.	Digital media used in the implementation of the Team-Based Project-Hybrid Learning (TBPHL) Strategy Loaded with Local Wisdom of Industrial Agriculture can facilitate students' ability to scientifically analyze the concept of physics on local wisdom of industrial agriculture	5	4	5
15	Digital media used in implementing the Team-Based Project-Hybrid Learning (TBPHL) Strategy with Local Wisdom of Industrial Agriculture can train students to self-regulate	4	4	5
	Score Total	19	17	18
	Maximum Score	20	20	20
	Persentase	95.00%	85.00%	90.00%

	Language	**Validator 1**	**Validator 2**	**Validator 3**
16.	The language used fulfills the readability aspect	4	4	5
17.	Conformity with the rules of the Indonesian language	4	4	5
18.	The sentences used are simple and easy to understand	4	4	4
19.	Clarity of instructions and directions on digital media containing local wisdom of industrial agriculture	5	5	3
20.	The language used is communicative	4	4	5
21.	The level of language used is following the cognitive development of students	5	5	4
	Score total	26	26	26
	Maximum Score	30	30	30
	Persentase	86.67%	86.67%	86.67%
	Average Persentase		88.58%	
	Category		Very good	

Furthermore, the recapitulation results for each aspect can be shown in Table 4.

Table 4. Recapitulation results for each aspect

Aspect	Validator	Percentage Analysis		Criteria
		$\sum p$	$\bar{p}$	
Construct	1	90.91%	89.08%	Very good
	2	92.72%		
	3	83.64%		
Content	1	95.00%	90.00%	Very good
	2	85.00%		
	3	90%		
Language	1	86.67%	86.67%	Very good
	2	86.67%		
	3	86.67%		

In learning media development, feasibility becomes an essential requirement before the media can be used in the learning process. Expert judgment based on empirical evidence is needed to justify the feasibility of the media created to ensure that the media can positively impact learning and offer reliable technology in the learning context (Susanto et al., 2023). Digital media and quality learning media are easy to use anywhere and anytime. Technically, it must be easy to use (Mulyati *et al.*, 2023). The presentation of animated illustrations gives students an understanding of a concept or process (Sinaga *et al.*, 2023). Facilitating learning difficulties will increase self-regulation abilities. A significant positive relationship exists with improving student learning outcomes (Fahyuni *et al.*, 2020). Digital media can provide convenience in providing material and questions that attract students' attention during the learning process, making learning activities exciting and fun to improve their digital literacy skills and understand the subject well (Irvandy *et al.*, 2023). Based on the research results, digital media with local wisdom is valid for use in the learning process because this media can motivate students with displays and content that attract students' attention to improve student learning outcomes.

Digital media can play a role in supporting the implementation of an optimal learning process. Media can be used as a means to convey material effectively and efficiently. Receiving abstract material will be faster using media than lectures without tools (Rusman, 2012). Media and stimulation can motivate students to learn something new (Munir et al., 2012). In the learning process in which there are limitations in space, time, and sensory power, the media can function as a bridge that can eliminate these limitations. For example, when students need to observe an object that is too big or too small, media images, films, or models can be used as an alternative to direct observation which is not possible. Likewise, when you need to observe the movement of objects that are too fast or observe an object that is too complex, you can use suitable media (Sadiman, 2007).

In the conventional learning process, students cannot experience an independent experience in discovering new concepts in learning. With the use of technology-based media such as computers and smartphones, students can adjust the pace of learning, interact, and make observations that foster a greater sense of curiosity about a physics concept in an incident (Rusman, 2012). Learning media is a tool in the form of media used in learning. One of the advantages of learning media is that, in some instances, it can represent the teacher in presenting information about the learning being taught to students.

Relevant research was conducted by Nur (2017), and the results showed an interaction between website-based physics learning and self-regulated learning on learning outcomes. The use of modules oriented towards student self-regulated learning in mathematical physics courses is also recommended because the validity of this module is also very feasible and can be used in the blended

learning process (Marisda et al., 2021). Other research shows that during online learning, a learning media is used, and partial results show that online learning has a positive and significant influence on self-regulated learning and student learning achievement during online learning (Handayani, 2021). Apart from that, various studies related to the use of digital media show that it can improve students' digital literacy skills (Irwansyah, 2023; Suminarsih, 2023; Pratama et al., 2019; Rahayu et al., 2019; Misbah, 2018). Learning media is expected to facilitate students' self-regulation skills and digital literacy. Thus, based on the results of the validation that has been carried out, this digital media has been declared valid and can be used in the physics learning process.

4. CONCLUSION

The validation results for each aspect, namely construct validation of 89.08%, content validation of 90%, and Language validation of 86.67%, these three aspects are in the very good category. The overall validation results show that digital media based on local wisdom of industrial agriculture achieves a validity score of 88.58% in the very good category and is suitable for use. Thus, digital media based on local wisdom of industrial agriculture can be used in high school physics as an alternative solution to innovative learning resources based on local wisdom. Suggestions from this study are 1) educators can use digital media that has been developed in learning physics in schools, 2) for other researchers, it can be developed in the analysis of physics concepts that have not been discussed in digital media based on this local wisdom of industrial agriculture and other forms of local wisdom.

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