

IoT - AI Mentoring and Diffusion in the Development of Digital-Based Teaching Devices for PAK Teachers

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Abstract

Education teacher religion Catholic (PAK) becomes part in system education in Indonesia which follow play a role important in improvement quality education . Improvement self with adapt technology in this 5.0 era become matter important . At this time Still There is difficulty PAK teachers in Semarang City in adapt progress technology especially the Internet of Things (IoT) and Artificial Intelligence (AI). Purpose devotion public This For spread knowledge (diffusion) and skills in leveraging IoT and AI in to design device teach education religion Catholic . Activities devotion public This implemented in School St. Francis Catechetical Pastoral College (STPKat) Semarang Assisi with amount participants 22 PAK teachers consists of from Elementary, Middle, and High School/Vocational High School teachers in Semarang City. Methods Which applied in devotion is method lecture , with material base law And document church Which support use Internet For kindness His creation , method discussion And ask answer done with method give example And step search application compile device teach PAK with method practice direct search And making in a way independent . Evaluation activity done with give questionnaire pretest -posttest through application Kahoot . Results activity This show existence improvement understanding , knowledge , and skills before And after given diffusion And mentoring utilization of IoT and AI in compile device teach education religion Catholic by 29.31 points .

Keywords: *Artificial Intelligence, Catholic religious teacher , Internet of Things, teaching tools*

INTRODUCTION

Success education determined by many factors including educators , participants educate , material lessons , methods learning , goals and environment (Krismiyati, 2017). One of the environmental factors is rapid internet development today This has an impact on education (Alexius Dwi Widiatna, 2020). Condition This in a way also directly impacts everyone subjects and all level education . Teachers as one of the element important in the education system play a role important as central in updates and improvements quality education (Kemendikbud, 2020). With development technology information (IT) this is then IT must made into as part in carry out activity learning (Sasmita, 2020). The role that can be provided by the application technology information This spur a procedure new in life , from life started until the end of the so - called with *e-life* . It means life This Already influenced by various need in a way electronic like such as e-education, e-library, e-journal and others (Sutirman, 2006). Teacher as perpetrator in transfer knowledge knowledge must understand How use technology the (Susilo Agus & Sarkowi, 2019). Whereas in Council Vatican II was written There is a number of principle the basis used runway in approach relevant education For to build spirituality in the digital age. Principles sourced from teachings Church Catholic , reflection theological , as well as perspective for Catholic education expert . In *the Encyclical Fides et Ratio* (the relationship of faith and reason) issued by Pope John Paul II in 1998, it is written that Catholic education is centered on the dignity of the human person. man as image of God (*imago Dei*) And objective end going to unity with The Creator (Paus Yohanes Paulus II, 1998). The above principle is in line with the concept that spiritual education views participant educate as subject Which dignified , not object passive . Therefore This digital technology must utilized as means For develop potential man in a way intact , good in a way

intellectual , emotional and spiritual (Congregation for Catholic Education, 2022).

Process learning education Catholic on basically integrating dimensions transcendental (Groome, 2018). This means that the use of digital technology in education faith No may trapped in reductionism or secularism. Therefore, education must open the horizons of students to find greater meaning and purpose in life, and to experience spirituality as an integral part of human existence. *Third* , approach education Catholic emphasize importance dialogue , reflection critical , and formation community (Franchi, 2020). The results of the research conducted on teachers concluded that there were limitations in teacher competence in using the internet, they did not yet have competence in using the internet, although most teachers had also used it as a learning resource in the process. (A, A Gde Somatanaya, 2017; Rini, 2016; Susilo Agus & Sarkowi, 2019; Usman, 2017). Conditions The same thing also happened to Catholic religious education teachers . Skills utilizing the internet and other applications, especially Artificial Intelligence (AI) for Catholic religious education teachers Still Enough low (Ibina Sipangkar et al., 2022). This matter based on from results questionnaire exploration of 33 Catholic religious education teachers in Central Java who have certified educators 9 teachers and 24 teachers who have not certified educator related with limitations knowledge that inhibits use *Internet of Things* (IoT) and *Artificial Intelligence* (AI) can shown in Figure 1 as following .

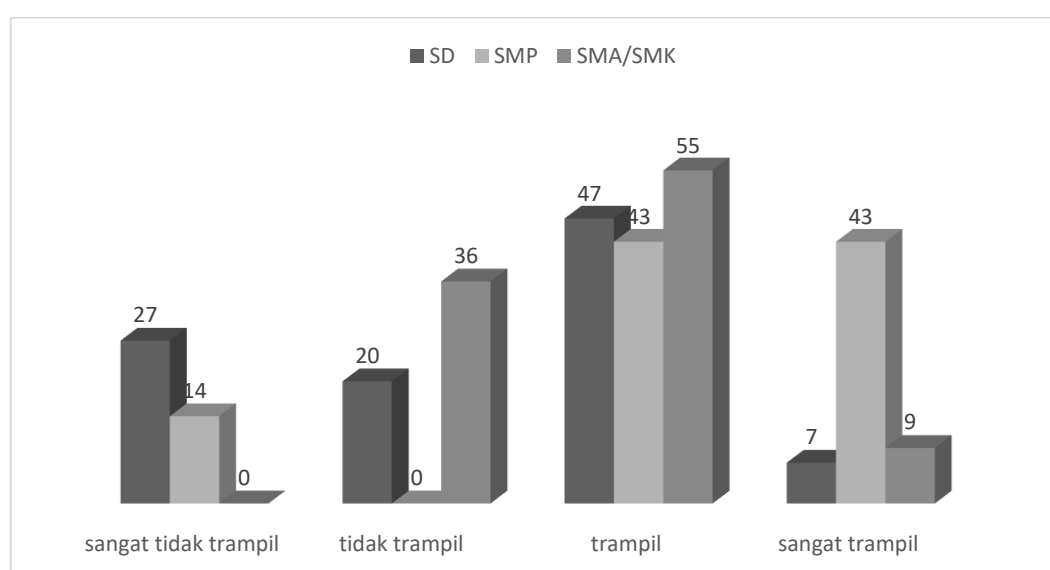


Figure 1. Percentage Skills The use of IoT and AI in PAK Teacher Teaching in Central Java

Source : Questionnaire (Google Form) of PPG Daljab Students 2022-2025

Referring condition and level teachers' difficulties in leveraging AI, conditions this also happens in groups Subject Teacher Work Group (KKG) and Subject Teacher Meeting (MGMP) for Catholic Religious Education in Semarang City. Subject KKG Group and MGMP are receptacle Work with school teachers in effort increase ability professional they . KKG and MGMP teachers are Educational container for to realize an advanced Indonesia that is sovereign , independent and has character through creation Pancasila students who focus on development results Study student holistically which includes competence literacy numeracy , character profile Pancasila students . Conditions This show that moment This is a Catholic religious education teacher in Central Java still need understanding will benefit *internet of things* (IoT) and *artificial intelligence* (AI) more area . Based on interview with Chairman Group The Elementary School Teachers' Work Group (KKG) and the Subject Teachers' Conference (MGMP) of Middle Schools and Senior High Schools/Vocational High Schools in Semarang City were declared that Catholic religious education teachers in Semarang City are lacking creative in innovate . The existence of assumption some PAK teachers that catholic religious studies only emphasize spiritual aspect only make PAK teachers tend to reluctant For innovate . On the other hand , the demands become a qualified teacher must covers aspect affective , skills and knowledge (Hartutik, 2021b, 2021a). In order to improve understanding and dissemination knowledge as diffusion as well as skills , then required mentoring utilization of IoT and AI for develop digital teaching tools for Catholic religious education teachers of elementary, middle, and high schools/vocational schools in Semarang City. The mentoring carried out in a way direct as well as helpful diffusion spread importance innovation IoT and AI assisted Catholic religious education teachers This aiming For can increase knowledge and skills make digital teaching tools with good and right .

Based on the description above , many problems faced by schools , especially Catholic

Religious Education (PAK) teachers . However thus related with activity devotion public This has done discussion together with the service team and the heads of KKG and MGMP agreed formulate problem priority on learning aspects to strengthen internal digital literacy frame utilize . As a target or partner in activities This service is school teachers basic education that is part of the Catholic Religious Education (PAK) KKG for Elementary Schools in Semarang City. Implementation digital literacy in formulating and utilizing AI for Catholic Religious Education (PAK) teachers later will produce This learning innovation product to target partners is expected to be able to be distributed to other elementary, middle, and high schools/vocational schools that are currently prepare self become an innovative and creative teacher . In detail, the problem is formulated as follows : (1) not yet owned by him teaching materials created in a way independent with design appropriate teaching module with Independent Curriculum , (2) lack of teacher knowledge in designing creative and non- creative learning media boring students , (3) the teachers have not experienced develop attractive teaching tools that support enjoyable learning , (4) love lack of teacher knowledge and skills in look for information AI -assisted , and (5) still lack of guidance Utilizing AI for Catholic Religious Education (PAK) teachers in general special and intense sustainable after training .

Importance knowledge digital literacy for Catholic Religious Education teachers who utilize AI to overcome problems fun learning in class need socialized to teachers. This is given to Catholic religious education teachers level Elementary and Middle Schools in Semarang City. The Importance teacher guidance with do Diffusion This For help increase ability design utilizing AI for Catholic Religious Education teachers KKG/MGMP Semarang City as effort improvement the quality of Catholic religious education teachers . With add knowledge about utilization of AI in prepare teaching tools then will make it easier for teachers to to design work innovative and sustainable in accordance hope Independent (Dwi Nurani et al., 2022)Curriculum . Strong motivation accompanied by with business will bring satisfactory result (Rahman & Elshap, 2018)This matter proven in a research that shows that Elementary School Teachers in rural areas capable succeed overcome existing problems with strong motivation (Harapan Edi, 2019)Research result related about teacher assistance in a group bring success with determination and passion .

METHOD

Development technology in the world of education the more rapidly , especially with presence *Internet of Things* (IoT) and *Artificial Intelligence* (AI) play a role in create more learning interactive and effective . In effort support improvement competency of Catholic Religious Education (PAK) teachers , activities devotion to public held at the Saint Francis Catechetical Pastoral College (STPKat) Assisi Semarang on February 20 , 2025. Taking place in the microteaching room which has been equipped with a 60- inch Smart TV , activities This carry theme "Media and Devices Catholic Religious Education Learning IoT and AI Based in the Era of Learning 5.0". Training This designed For equip teachers with skills in utilise IoT and AI technology for increase quality device learning . The methods applied in activity This covering education and guidance directly , where participants get distribution knowledge about urgency use technology in learning . Participants involved in activity This consists of of 10 PAK teachers at elementary school level , 6 junior high school teachers, and 6 senior high school/vocational school teachers.

As stages beginning , participants take a 15- minute Kahoot - based pretest For measure level understanding beginning they to the concept of IoT, AI, and its use in development device learning . Next , the session training involving combination method lectures , practice direct , and assistance intensive in creating learning media . Teachers are also guided in search source relevant teaching materials as well as compilation assessment learning based on technology . During this process , participants directed For in a way independent exploring and optimizing AI as tool help in to design material more learning effective . In the session end , done discussion interactive For identify challenge as well as obstacles faced by teachers in implement technology this is in class . As form evaluation , posttest return done use Kahoot app with same question like pretest. The results of posttest This become indicator improvement understanding participant after get comprehensive mentoring and training . Activities This expected can give benefit real for teachers in adopt technology based on IoT and AI in learning , so that can create experience learn more innovative and relevant for student .

Implementation of this program designed in three group main aspects that focus learning For increase effectiveness and innovation in the world of education . First , the development of learning media based on technology that is not only creative and interactive , but also fun , to do with support team implementer to comply with need participant educate . Second , strengthening literacy intelligence artificial intelligence (AI) in YouTube context aims For equip power educators and students with better understanding deep about utilization technology in learning , supported by members team from the Religious Education Study Program Catholic as well as discipline other relevant sciences . Third , the application of AI in making question designed For speed up adoption technology innovative in the environment education , so that teachers and students can more easy access as well as optimize system evaluation learning . Third group activity This will realized through method *Focus Group Discussion* (FGD), mentoring , and structured workshops ensure every stages walk in a way systematic and provide optimal impact for all over participants in table 2.

Table 2. Detailed Activity Stages of Learning Aspects and **Management** Aspects Activity

No	Aspect Activity	Stages Activity Aspect Learning	Participation Partners
1	Development of learning media Curriculum Independent	(1) Preparation material Which furthermore will made into as reference (2) FGD strengthening utilization of Modules, as form consolidation integration of one P3 dimension in it . (3) Mentoring simulation products by partners (4) Validation product by the Implementation Team , improvements when required (5) Evaluation	• Partners do activity together team PKM implementer • Partners as FGD participants • Partners prepare hard module • Partners repair product when required • Partners ready repair when needed
2	Track AI -based Digital Literacy	(1) Preparing the procedures AI internet tracking in making learning media (2) Evaluation results AI tracking	Partners do activity tracking AI literacy
3	Making material teach leveraging AI	(1) Do identification and analysis problem subject teaching materials Catholic Religious Education lessons	Partners do activity tracking and compilation teaching materials
4	Presentation results work	(1) Making media teach AI -assisted	Active partners presenting media teach And material teach

RESULTS AND DISCUSSION

Training , mentoring and diffusion knowledge held at the Saint Francis Catechetical Pastoral College (STPKat) Assisi Semarang on February 20, 2025 with involving 20 Catholic Religious Education (PAK) teachers from elementary, middle, and high school/vocational school levels . The participants own experience teaching that varies , starting from from 3 to 20 years . In implementation , activities This utilise facility technology such as connected Smart TVs and LCDs with a stable internet network , allows participant For access material learning AI based with more optimal. At the stage beginning , participants given understanding about benefits of the Internet of Things (IoT) and Artificial Intelligence (AI) in the learning process . In addition that , the basis was also conveyed document church that supports utilization of the internet as means progress for human . Exposure This give outlook that the internet can can be a learning medium utilized by PAK teachers in develop method more teaching innovative , in line with mission church in to make smart generation young . Next , participants introduced with various example application AI -based that can used in design as well as packaging material Catholic religious learning . With help technology this , material can developed become a more learning medium interactive and engaging for students . Figure 2 shows one of the the material presented to participant in session training

This .



Picture 2. Material Benefits of IoT and AI in PAK Learning

Education Teacher Religion Catholic need Keep going renew knowledge And skills they in line with development technology . This is in harmony with results Congregation Education Catholic Which confirm that digital technology must utilized as tool For support development potential man in a way comprehensive , covering aspect intellectual , emotional , and spiritual(Congregation for Catholic Education, 2022). With improvement understanding And knowledge gained during the mentoring, then participants can discuss together to share experiences and skills. Discussions are conducted with PAK teachers who teach at the same or different levels. This is important to provide input and consider the creation of correct devices that are in accordance with their learning phase. The results of the mentoring are that participants (PAK teachers) are able to design teaching materials according to the Merdeka Curriculum teaching module design by completing teaching materials, media, learning evaluation tools with AI applications. Figure 3 is the atmosphere of the mentoring carried out with participants.



Picture 3. The Process of Mentoring and Diffusion of the Benefits of IoT and AI for PAK Teachers

Table 1. Level Knowledge Participant Before And After Mentoring and Diffusion of IoT and AI

Criteria	Pretest	Posttest
Lots of data (n)	22	22
Max	65	91
Min	48	61
Rata-rata	58	75
Peningkatan	29,31	

Level of knowledge of Catholic religious education teachers to knowledge IoT and AI before and after mentoring and diffusion through giving questionnaire *pretest* and *posttest* can explained in table 1 that 1) the value before guidance maximum 65 then increase to 91.2) the minimum value before minimum guidance of at least 48 increased to 61.3) there is average increase of 29.31 points from 58 before guidance to 75. Condition This show that level the knowledge and skills of Catholic religious education (PAK) teachers have experienced improvement with existence guidance and diffusion about benefits of IoT and AI in compilation teaching tools for Catholic religious education in schools . In Figure 4 is work guidance and diffusion about benefits of IoT and AI in compilation teaching tools for Catholic religious education teachers from level school elementary school in Semarang City. The teacher back to Not yet know utilization of AI in learning , for 30 minutes has capable create interesting power point teaching media

and also animated videos . Evaluation from activity devotion to public this is also seen from enthusiasm of education teachers religion Catholics present . All teachers have capable make task with Good although Not yet maximum . Condition This appear in session discussion ask answer , the teachers asked a number of question like whether paid AI apps , how can we buy it , approximately What just applications that we can utilize other than what was learned on the day this , and some question others . Even the teachers expressed their great pleasure. get companion day This Because No need pay However Can ask straight to the nara source with clear .



Picture 4. Team Devotion And Catholic Religious Education Teachers

CONCLUSION

Activity devotion public in the form of mentoring and diffusion Benefits of IoT and AI for Elementary, Middle, and High School/Vocational School Teachers PAK Semarang City Implemented with good and very successful . Activities This proven capable increase knowledge and skills of religious education teachers amounted to 29.3. Activities felt participants are very useful . The results of the mentoring and diffusion process the use of AI has collected in google drive with results very interesting and good media products and teaching materials . Enthusiasm participant in follow session lectures , demonstrations , and searches material assisted by IoT and AI independent has bear fruit very good results . Activities This expected can continued and became a Bimas program Catholics in all cities in Indonesia.

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