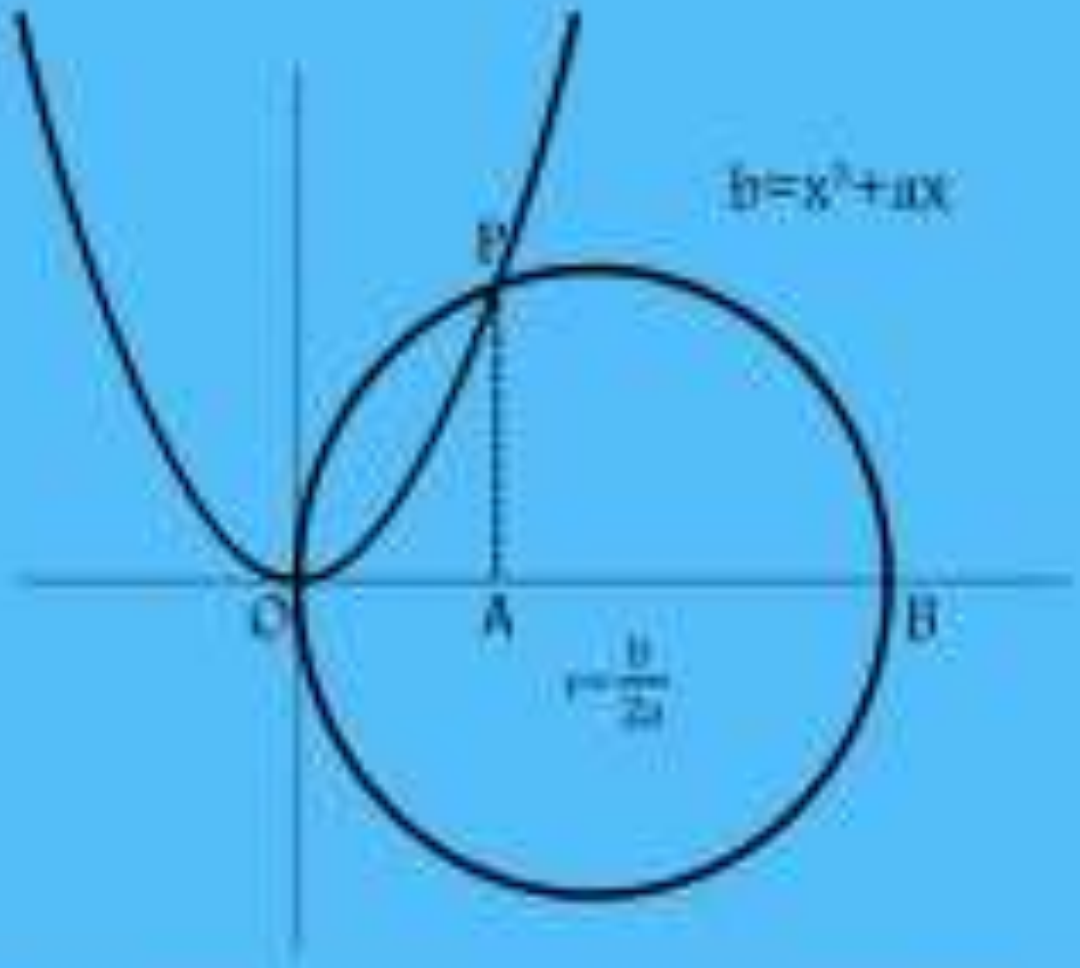
TÜRK BİLGİSAYAR VE MATEMATİK EĞİTİMİ DERGİSİ



TURKISH JOURNAL OF COMPUTER AND MATHEMATICS EDUCATION

e-ISSN 2146-4553
www.dergipark.org.tr/tr/pub/turkbilmat
www.trdizin.gov.tr

Editorial Team

Editorial Members:

Dr. Dinh Tran Ngoc Huy
Professor, Banking and Finance, HCM, Viet Nam

Montassar Aidi Sharif
Ph.D. in Electrical Engineering, Kirkuk, Al Wasity, Moalimeen, House 67

Dr Anand Sharma
PhD(Engg), MTech, BE,LMCSI, MIE(India), MIET(UK)
Asst.Prof. CSE Department,
School of Engineering and Technology,
Mody University of Science and Technology, Lakshmangarh
Sikar, Rajasthan, INDIA

ASS PROF TAMER M.Y. ALKADASH
Assistant Professor, Tamer M. Alkadash, (FHEA-UK)
Bsc, MBA,PhD
Chair of University Research Council- Gulf University
Fellowship, Advance Higher Education, UK (FHEA-UK)

Login (https://turcomat.org/index.php/turkbilmat/login)

Submit Articles (https://turcomat.org/index.php/turkbilmat/about/sub

Home (https://turcomat.org/index.php/turkbilmat)
Aims and Scope (https://turcomat.org/index.php/turkbilmat/aims_and_scope)
Author Guidelines (https://turcomat.org/index.php/turkbilmat/author_guidelines)
Ethical Principles and Publication Policy (https://turcomat.org/index.php/turkbilmat/ethics_and_policies)
Archive (https://turcomat.org/index.php/turkbilmat/issue/archive)
Editorial Board (https://turcomat.org/index.php/turkbilmat/about/editorialTeam)
Contact (https://turcomat.org/index.php/turkbilmat/about/contact)
About (https://turcomat.org/index.php/turkbilmat/about)
Abstracting / Indexing (https://turcomat.org/index.php/turkbilmat/abstracting)
Copyright (https://turcomat.org/index.php/turkbilmat/copyright)

Abstracting / Indexing

Turkish Journal of Computer and Mathematics Education is abstracted and indexed in:

TR Dizin (http://cabim.ulakbim.gov.tr/tr-dizin/tr-dizinde-dizinlenen-dergi-listesi/)

SCOPUS (http://www.scopus.com/sourceid/21100902608)

DOAJ (https://doaj.org/toc/1309-4653)

ERIH Plus (https://dbh.nsd.uib.no/publiseringskanaler/erihplus/periodical/info.action?id=493814)

EBSCO (https://www.ebscohost.com/titleLists/a9h-journals.htm)

ProQuest (https://www.ebscohost.com/titleLists/a9h-journals.htm)

Index Copernicus (http://journals.indexcopernicus.com/Turk+Bilgisayar+ve+Matematik+Egitimi+Dergisi,p24781795,3.html)

Login (https://turcomat.org/index.php/turkbilmat/login)

Submit Articles (https://turcomat.org/index.php/turkbilmat/about/sub

Home (https://turcomat.org/index.php/turkbilmat)
Aims and Scope (https://turcomat.org/index.php/turkbilmat/aims_and_scope)
Author Guidelines (https://turcomat.org/index.php/turkbilmat/author_guidelines)
Ethical Principles and Publication Policy (https://turcomat.org/index.php/turkbilmat/ethics_and_policies)
Archive (https://turcomat.org/index.php/turkbilmat/issue/archive)
Editorial Board (https://turcomat.org/index.php/turkbilmat/about/editorialTeam)
Contact (https://turcomat.org/index.php/turkbilmat/about/contact)
About (https://turcomat.org/index.php/turkbilmat/about)
Abstracting / Indexing (https://turcomat.org/index.php/turkbilmat/abstracting)
Copyright (https://turcomat.org/index.php/turkbilmat/copyright)

Download Paper Template (/download/paper_template.docx)

Science Research Society © Contact (https://turcomat.org/index.php/turkbilmat/about/contact)

Published: 2021-05-10

Articles

E- FAWATEERcom Adoption in Jordan : A Proposed Frame Work User Perspective (https://turcomat.org/index.php/turkbilmat/article/view/5818)

Mohammad Haider M. Alibraheem

01-07

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5818/4843)

Semi-Generalized Closed Set in the Closure Spaces (https://turcomat.org/index.php/turkbilmat/article/view/5821)

Dr. Neeran Tahir Abd Alameer , et. al.

08-11

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5821/4844)

Exploring the causal influence of beliefs on mathematical competencies using an integrated approach of Interval-valued Intuitionistic Fuzzy Relational Map and TOPSIS (https://turcomat.org/index.php/turkbilmat/article/view/5822)

S. Arokiamary, et. al.

12-23

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5822/4845)

Does Emotional Intelligence Prompt Knowledge Sharing Behavior among Academic Staff (https://turcomat.org/index.php/turkbilmat/article/view/5823)

Dr. Amer Hatamleh

24-37

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5823/4846)

Extracting User Behavioural Control Styles based on Process Mining (https://turcomat.org/index.php/turkbilmat/article/view/5824)

N.Surya Naga Venkata Koushik, et. al.

38-42

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5824/4847)

Systematic Analysis and Future Research Directions in Artificial Intelligence for Marketing (https://turcomat.org/index.php/turkbilmat/article/view/5825)

Worakamol Wisetsri, et. al.

43-55

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5825/4848)

Predictive Analysis of Mutual Fund Investment Using Sustainability Index Evidence from Indian Stock Market (https://turcomat.org/index.php/turkbilmat/article/view/5826)

Heera S Kumar, et. al.

56-68

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5826/4849)

On The Question Of Calculation Of The Flow Velocity Distribution When Liquid Flowing Cylindrical Bodies (https://turcomat.org/index.php/turkbilmat/article/view/5829)

Eshev Sobir Samatovich, et. al.

69-73

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5829/4852)

Methodology For Assessing The Production Potential Of Grain Processing Enterprises. (https://turcomat.org/index.php/turkbilmat/article/view/5830)

Jalilov Bahrom Sotiboldievich

74-80

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5830/4853)

Implementation Of Fun Learning Through Mind Mapping Method In History Of Physics Course In Physics Education Department, Universitas Negeri Gorontalo (https://turcomat.org/index.php/turkbilmat/article/view/5837)

Citron S. Payu

81-86

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5837/4854)

Developing Multi-User Social Big Data For Emergency Detection Based On Clustering Analysis And Emergency Management In Edge Computing (https://turcomat.org/index.php/turkbilmat/article/view/5838)

Pavan Madduru, et. al.

87-94

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5838/4855)

Analysis Of Phishing Websites Using An Competent Feature-Based Framework (https://turcomat.org/index.php/turkbilmat/article/view/5840)

Bennila Thangammal.C, et. al.

95-101

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5840/4856)

A Review of Sensor Application in E-Farming (https://turcomat.org/index.php/turkbilmat/article/view/5842)

Samrudhi Kaware

102-105

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5842/4857)

Loan as a backbone for Agriculture: Evidence from Banks (https://turcomat.org/index.php/turkbilmat/article/view/5843)

Abhishek.T, et. al.

106- 114

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5843/4858)

Adaptive And Fault Tolerant Random Forest-Based Method For Heart-Rate Observing Utilizing Photoplethysmography In Healthcare (https://turcomat.org/index.php/turkbilmat/article/view/5844)

G. Jasmine Christabel, et. al.

115- 121

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5844/4859)

A Study on Risk and Return Analysis of Selected Banking Securities (https://turcomat.org/index.php/turkbilmat/article/view/5849)

Mehta Vani Joghee, et. al.

122- 127

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5849/4862)

A Study On Technical Analysis Of Selected FMCG Scripts With Reference To Annamalai Capital Services (P) Ltd., Coimbatore City (https://turcomat.org/index.php/turkbilmat/article/view/5850)

Mehta Vani Joghee, et. al.

128- 137

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5850/4863)

A Study On Students' Perception On Online Learning During Covid-19 Pandemic (https://turcomat.org/index.php/turkbilmat/article/view/5851)

R Muthukrishnan, et. al.

138- 144

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5851/4864)

Implementation Of The CLIS Model To Improve Student Learning Outcomes In Material Temperature And Changes (https://turcomat.org/index.php/turkbilmat/article/view/5853)

Dewi Diana Paramata, et. al.
151- 157

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5853/4866)

Impact Of Goods And Services Tax On Fmcg Sector (https://turcomat.org/index.php/turkbilmat/article/view/5857)

Mr. Gowtham Ramkumar, et. al.
158- 164

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5857/4868)

Healthcare 4.0 Enabled Lightweight Security Provisions for Medical Data Processing (https://turcomat.org/index.php/turkbilmat/article/view/5858)

Nilesh Uke,
165- 173

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5858/4869)

Insurance Fraud Detection using Spiking Neural Network along with NormAD Algorithm (https://turcomat.org/index.php/turkbilmat/article/view/5859)

Gopikrishna Panda, et. al.
174- 185

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5859/4870)

QoS Improvement in MANET using Self Organized Balanced Optimization (https://turcomat.org/index.php/turkbilmat/article/view/5860)

Anup J Johnson, et. al.
186- 194

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5860/4871)

Authentication of Sub-NUMA Clustering effect on Intel Skylake for Memory Latency and Bandwidth (https://turcomat.org/index.php/turkbilmat/article/view/5861)

Srikanta Kumar Mohapatra, et. al.
195- 204

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5861/4872)

Convergence Of Artificial Intelligence And Internet Of Things In Predictive Maintenance Systems – A Review (https://turcomat.org/index.php/turkbilmat/article/view/5862)

Gopi Krishna Durbhaka, et. al.
205- 214

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5862/4873)

Comparative Analysis of Various Face Detection and Tracking and Recognition Mechanisms using Machine and Deep Learning Methods (https://turcomat.org/index.php/turkbilmat/article/view/5863)

Prof. M. Seshaiah, et. al.
215- 223

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5863/4874)

Educational Training For Processing Invoice Of Vendor Identification And Payments Using Python-Tesseract (https://turcomat.org/index.php/turkbilmat/article/view/5864)

Rekha M, et. al.
224- 228

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5864/4875)

Primitive Diabetes Prediction using Machine Learning Models: An Empirical Investigation (https://turcomat.org/index.php/turkbilmat/article/view/5865)

Priyabrata Sahoo, et. al.
229- 236

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5865/4876)

Exploring The Robustness Of Digital Watermarking Algorithms Based On Transform Function And Machine Learning

(https://turcomat.org/index.php/turkbilmat/article/view/5867)

Rakesh Kumar Verma, et. al.

237- 252

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5867/4877)

A Study on the Future of Campus Placements in India Post the Pandemic: An Industrial Perspective (https://turcomat.org/index.php/turkbilmat/article/view/5868)

Dr. Ashutosh Mathur

253- 263

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5868/4878)

Life Extension Of Transformer Mineral Oil Using AI-Based Strategy For Reduction Of Oxidative Products (https://turcomat.org/index.php/turkbilmat/article/view/5869)

Shripati Vyas, et. al.

264- 271

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5869/4933)

Optimizing High-Performance Weighted Extreme Learning Machine with DAPM for Imbalance Credit Card Fraud Detection (https://turcomat.org/index.php/turkbilmat/article/view/5870)

Sonam Mittal, et. al.

272- 283

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5870/4880)

Study on Service Quality of Insurance Companies -A comparative study. (https://turcomat.org/index.php/turkbilmat/article/view/5871)

Dr Susheela Devi B Devaru, et. al.

284-291

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5871/4881)

Enhancement of Mechanical Properties of Hybrid Composite Materials (https://turcomat.org/index.php/turkbilmat/article/view/5873)

Zaid Ghalib Abdul-kadhim Al-Jlaihawi, et. al.

298- 302

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5873/4883)

Intensification and Extensification of Entertainment Taxes to Increase Own-Source Revenue (PAD) in Makassar City (https://turcomat.org/index.php/turkbilmat/article/view/5874)

Nurdin Nara, et. al.

303- 312

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5874/4884)

Simulation Of Solar Water Heating System In Single Family House In Various Weather By Using Polysun Programs (https://turcomat.org/index.php/turkbilmat/article/view/5875)

Hazim Jassim Jaber , et. al.

313- 317

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5875/4885)

The Role of distance learning via the Internet in Learning Programming: Learners' Point of View (https://turcomat.org/index.php/turkbilmat/article/view/5876)

Zainab Fattah Yousif

318- 334

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5876/4886)

Fuzzy Logic Based Secured Routing In Vanets (https://turcomat.org/index.php/turkbilmat/article/view/5877)

J. Stalin, et. al.

335- 348

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5877/4887)

The Effect of the Mobile Correspondent Strategy on the Achievement of Students of the College of Basic Education / Department of Science in the practical Subject of Algae and Fungi (https://turcomat.org/index.php/turkbilmat/article/view/5885)

Rania Mohammed Jassam Hammadi, et. al.

349-357

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5885/4903)

The extent to which the 6th grade science textbook includes 21st century skills (https://turcomat.org/index.php/turkbilmat/article/view/5886)

Saja Hamid Hantoush Al-Rubaie, et. al.

358-368

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5886/4906)

Rational perception of reality and its relationship to ethical decision-making among female students of the kindergarten department (https://turcomat.org/index.php/turkbilmat/article/view/5888)

Dunia Faris Abdul-Ghani Al-Chadirji, et. al.

369-382

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5888/4912)

Awareness of Chemical Innovations Among Teachers of Chemistry (https://turcomat.org/index.php/turkbilmat/article/view/5889)

Rashwan Jalil Saeed Al-Mashkoor, et. al.

383-394

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5889/4913)

Effectiveness of Conflict Management Games and Activities in Workplace (https://turcomat.org/index.php/turkbilmat/article/view/5891)

Dr.Radha GaneshKumar, et. al.

395-400

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5891/4914)

Convolutional Neural Networks Based Optimal Management of Agricultural Crops (https://turcomat.org/index.php/turkbilmat/article/view/5890)

Mohammed Thajeel Abdullah, et. al.

401-410

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5890/4915)

A Study On Effectiveness Of Competency Mapping Through Training AndDevelopment (https://turcomat.org/index.php/turkbilmat/article/view/5892)

Dr. Saikumari V, et. al.

411-416

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5892/5097)

A Study On Effectiveness Of Learning And Development With Reference To A Private Limited Company.,Chennai (https://turcomat.org/index.php/turkbilmat/article/view/5896)

R.Banureka, et. al.

417-424

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5896/4917)

A Study On Recruitment Process At Msys Technologies (https://turcomat.org/index.php/turkbilmat/article/view/5895)

S.Sasirekha, et. al.

425-432

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5895/4918)

A Study on Customer Perception about Services Offered At Jai Motors (https://turcomat.org/index.php/turkbilmat/article/view/5897)

S.Purushothaman, et. al.

433-442

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5897/4919)

The Effect of the Pentagram Strategy on Achievement Among Fifth Year Middle School Students in Chemistry (https://turcomat.org/index.php/turkbilmat/article/view/5899)

Rasha Nihad Adel, et. al.
443-450

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5899/4920)

Multiplicative Triple Fibonacci Sequence of Third Order (https://turcomat.org/index.php/turkbilmat/article/view/5907)

Vipin Verma, et. al.
451-458

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5907/4921)

Generalized Parametric Exponential Entropy Measure of degree on Fuzzy Set (https://turcomat.org/index.php/turkbilmat/article/view/5908)

Bhagwan Dass, et. al.
459-468

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5908/4922)

Retracted (https://turcomat.org/index.php/turkbilmat/article/view/5909)

Retracted
469-475

A Framework Of Big Data As Service Platform For Access Control & Privacy Protection Using Blockchain Network (https://turcomat.org/index.php/turkbilmat/article/view/5910)

Santosh Kumar Sharma, et. al.
476-485

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5910/5452)

Analytical Model for Mitigating Primary User Emulation Attack using Hypothesis Testing in Cognitive Radio Networks (https://turcomat.org/index.php/turkbilmat/article/view/5912)

Dr. Mahesh Kumar N, et. al.

486-500

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5912/4925)

Mutual authentication and data security in IOT using hybrid mac id and elliptical curve cryptography (https://turcomat.org/index.php/turkbilmat/article/view/5913)

Harish Kumar N, et. al.

501-507

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5913/4926)

Design & development of secured energy-efficient double-stage cooperative multi-path routing protocol in multi-hop co-operative WSNs to maximize the network lifetime & minimize energy consumption (https://turcomat.org/index.php/turkbilmat/article/view/5914)

Anupama T.A, et. al.

508-514

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5914/4927)

An Auto-Scaling Approach to Load Balance Dynamic Workloads for Cloud Systems (https://turcomat.org/index.php/turkbilmat/article/view/5915)

Dr. Sharvani GS, et. al.

515-531

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5915/4928)

Technology Transformation through Enterprise Resource Planning (ERP) towards Small and Medium Enterprises (SME), Tamilnadu. (https://turcomat.org/index.php/turkbilmat/article/view/5916)

Chandrasekaran.S , et. al.

532-549

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5916/4929)

A Hybrid Framework For Drug Response Similarity Opting Machine Learning Approach (https://turcomat.org/index.php/turkbilmat/article/view/5917)

M Supriya Menon, et. al.
550-558

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5917/4930)

An Enhanced Video Assisted Health Education System (https://turcomat.org/index.php/turkbilmat/article/view/5918)

k. Paavizhi, et. al.
559-568

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5918/4931)

Mean Waiting time Analysis on Bukl Arrival Fuzzy Queueing System Using Maximum Likelihood Estimation (https://turcomat.org/index.php/turkbilmat/article/view/5930)

V.Ramalakshmi, et. al.
569- 574

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5930/4932)

Classification and Grading of Arecanut Using Texture Based Block-Wise Local Binary Patterns (https://turcomat.org/index.php/turkbilmat/article/view/5931)

Bharadwaj N K, et. al.
575-586

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5931/4934)

Implementation of Intelligent Biometric Attendance System (https://turcomat.org/index.php/turkbilmat/article/view/5932)

R. Nagarajan, et. al.
587-593

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5932/4935)

Gender Influenceon Purchase Intention And Customer Commitmentin Social Media Marketing (https://turcomat.org/index.php/turkbilmat/article/view/5933)

S. Mohamed Moosa, et. al.

594-600

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5933/4936)

Conceptual Framework for Secure Cluster Management In Software Networks (https://turcomat.org/index.php/turkbilmat/article/view/5934)

Chakali Maddilety , et. al.

601-605

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5934/4937)

Classification And Grading Of Arecanut Using Texture Based Block-Wise Local Binary Patterns (https://turcomat.org/index.php/turkbilmat/article/view/5935)

Bharadwaj N K, et. al.

606 - 616

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5935/4938)

Image Generation for Real Time Application Using DCGAN (Deep Convolutional Generative Adversarial Neural Network) (https://turcomat.org/index.php/turkbilmat/article/view/5936)

Dr. V. Vijeya Kaveri , et. al.

617 - 621

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5936/4939)

Impact of Covid-19 On Foreign Direct Investment in India (https://turcomat.org/index.php/turkbilmat/article/view/5937)

Dr. S. Saravanan, et. al.

622 - 626

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5937/4940)

A Study of failure Multi-Term Central HVDC Conductors In Wind Power Transmission Systems (https://turcomat.org/index.php/turkbilmat/article/view/5938)

Kayapati Rajagopal , et. al.

627 - 632

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5938/4941)

Identification of Throat Cancer by Machine Learning : A Surey (https://turcomat.org/index.php/turkbilmat/article/view/5939)

R. Akshara, et. al.

633 - 638

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5939/4942)

Deep Wavelet Autoencoder Based Brain Tumor Detection Analysis Using Deep Neural Network (https://turcomat.org/index.php/turkbilmat/article/view/5940)

T.Balamurugan, et. al.

639 - 645

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5940/4943)

Integrated Security and Privacy Framework for Big Data in Hadoop MapReduce Framework (https://turcomat.org/index.php/turkbilmat/article/view/5941)

Sirisha N, et. al.

646 - 662

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5941/4944)

Design And Development Of Security Frameworks For Performance Enhancement Of Public Key Crytogrphy Using Genectic Algorithm (https://turcomat.org/index.php/turkbilmat/article/view/5942)

Srinivasan N, et. al.

663 - 667

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5942/4945)

A Study Of Employee Development And Training In Private Industry In India (https://turcomat.org/index.php/turkbilmat/article/view/5943)

Sule Bipin Subodh , et. al.
668 - 671

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5943/4946)

Energy Efficiency In Wireless Sensor Network Using Dynamic Duty Cycle Based Sensor Mac (https://turcomat.org/index.php/turkbilmat/article/view/5945)

Saravanakumar Pichumani, et. al.
681 - 685

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5945/4948)

Brain Tumor Detection using Convolutional Neural Network (https://turcomat.org/index.php/turkbilmat/article/view/5946)

Poornimasre Jegannathan, et. al.
686-692

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5946/4949)

An Enhanced Video Assisted Health Education System (https://turcomat.org/index.php/turkbilmat/article/view/5951)

Djumanova Aijan Baxtiyarovna, et. al.
693-696

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5951/4951)

Humanrecognition Using ‘Pso-Ofa’ In Low Resolution Videos (https://turcomat.org/index.php/turkbilmat/article/view/5952)

K.Ranga Narayana, et. al.

697-703

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5952/4975)

Approximation methods to solve a single machine scheduling problem with fuzzy due date to minimize multi-objective functions (https://turcomat.org/index.php/turkbilmat/article/view/5953)

Hanan Ali Chachan, et. al.

704-713

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5953/4953)

Review of Cyber Security on Oil and Gas Industry in United Arab Emirates: Analysis on the Effectiveness of the National Institute of Standards and Technology's (NIST) Cybersecurity Framework (https://turcomat.org/index.php/turkbilmat/article/view/5954)

Mohamed Jumah ALDhanhani, et. al.

714-720

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5954/4954)

Reactive power control of grid-connected solar photovoltaic system (https://turcomat.org/index.php/turkbilmat/article/view/5955)

Naveen Gira, et. al.

721-729

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5955/4955)

Relationship Of Knowledge, Attitude, And Perception Of Disease With The Utilization Of Health Services For Non-Convertive Diseases In Rsud Haji Makassar (https://turcomat.org/index.php/turkbilmat/article/view/5956)

Muh. Yusri Abadi, et. al.

730-735

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5956/7124)

Factors influencing the microwave propagation performance of different types of materials

(https://turcomat.org/index.php/turkbilmat/article/view/5957)

Saib Thiab Alwan, et. al.
736-744

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5957/4957)

The Effectiveness Tera Aerobic And Nutrition Management Towards The Heart Fitness Of Prospective Haji Conventions (https://turcomat.org/index.php/turkbilmat/article/view/5958)

Rini Fahriani Zees, et. al.
745-749

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5958/7118)

A Freelance Career for Lower Class (https://turcomat.org/index.php/turkbilmat/article/view/5959)

Priyank Kabra, et. al.
750-753

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5959/4959)

Some New Properties of Convergence Uncertain Sequence in Measure (https://turcomat.org/index.php/turkbilmat/article/view/5960)

Zainab Hayder Abid AL-Aali, et. al.
754-758

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5960/4960)

The Role Of The Hadis Imam Al-Bukhari In The Spiritual Education Of Youth (https://turcomat.org/index.php/turkbilmat/article/view/5961)

Agzamkhodzhaeva Shakhnoza Saidmatlabovna, et. al.
759-769

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5961/4961)

The Effectiveness of the Model Employability Skills Learning Based on Trainer Simulator Air Conditioner in Vocational High Schools (https://turcomat.org/index.php/turkbilmat/article/view/5962)

Yunesman, et. al.
770-779

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5962/4962)

Practical Model Intelligence Computer Assisted Instruction project-based learning-oriented High Order Thinking Skill (https://turcomat.org/index.php/turkbilmat/article/view/5963)

Tongam E Panggabean, et. al.
780-790

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5963/4963)

Crowdsensing using Geofencing for Smart Parking (https://turcomat.org/index.php/turkbilmat/article/view/5964)

Meet Mineshbhai Shah, et. al.
791-796

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5964/4964)

Deep Learning For Improved Heat Index Using Iot-Based Data (https://turcomat.org/index.php/turkbilmat/article/view/5965)

Dr. C. Jayaprakash, et. al.
797-806

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5965/4965)

Software Quality Prediction Method Using Fuzzy Logic (https://turcomat.org/index.php/turkbilmat/article/view/5966)

Ritu, et. al.
807-817

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5966/7123)

Action Recognition Using Deep Learning And Cnn (https://turcomat.org/index.php/turkbilmat/article/view/5967)

Mihir Verma, et. al.
818-824

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5967/4967)

Game Ai Using Parametrized Behavior Monitoring (https://turcomat.org/index.php/turkbilmat/article/view/5968)

Raghav Suriyashekar, et. al.
825-828

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5968/4968)

A Process Of Implementing Zigbee Protocol With Machine Learning Algorithm For Greenhouse Set-Up (https://turcomat.org/index.php/turkbilmat/article/view/5969)

E Mercy Beulah, et. al.
829-839

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5969/4969)

Analysis On Radar Image Classification Using Deep Learning (https://turcomat.org/index.php/turkbilmat/article/view/5970)

B.Yamini Pushpa, et. al.
840-845

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5970/4970)

Different Approaches To Studying The Natural-Scientific And Historical-Philosophical Heritage Of The Khorezm Academy Of Ma’mun (https://turcomat.org/index.php/turkbilmat/article/view/5971)

Masharipova Gularam Kamilovna
846-856

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5971/4971)

The Role Of National Education In The Formation Of Personal Spirituality (https://turcomat.org/index.php/turkbilmat/article/view/5972)

Ortiqova Dilbar Ortiqovna, et. al.

857-865

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5972/4972)

Impact Of Social Media On Consumers Brand Preference For Laptops (https://turcomat.org/index.php/turkbilmat/article/view/5973)

Dr.Muskan Nagi, et. al.

866-873

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5973/4973)

The Islamic Models Of Corporate Governance (https://turcomat.org/index.php/turkbilmat/article/view/5974)

Azahari Jamaludin

874-878

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5974/4974)

Socio-Pedagogical Aspects Of Legal Culture Development In STUDENTS (https://turcomat.org/index.php/turkbilmat/article/view/5975)

Shadiev Safar, et. al.

879-888

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5975/4976)

Intelligent Digital Learning Services Laboratory in Smart Classroom Environment (https://turcomat.org/index.php/turkbilmat/article/view/5976)

Yasdinul Huda, et. al.

889-893

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5976/4977)

Differential Evolution based Cluster optimization for Multi valued data sets (https://turcomat.org/index.php/turkbilmat/article/view/5979)

P Gopala Krishna, et. al.

894-907

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5979/4978)

Detection of Macular Edema in Acute Phase through Optical Coherence Tomography using Local Binary Pattern Feature (https://turcomat.org/index.php/turkbilmat/article/view/5980)

Anjali Shelkikara, et. al.

908-914

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5980/4979)

European Conventions that make States Cooperate Against Cyber Crimes and the Problem of Electronic Evidences for Investigations and Criminal Processes (https://turcomat.org/index.php/turkbilmat/article/view/5981)

Rezarta Tahiraj , et. al.

915-929

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5981/4980)

Molecular Interactions and Thermophysical Properties of 1, 4 Dioxane with Bromo benzene, Ethyl benzene at various Temperatures via Nonlinear Model (https://turcomat.org/index.php/turkbilmat/article/view/5982)

R. Ramesh, et. al.

930-939

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5982/4981)

Borewell Management, Deaths Of Children- A Case Study In India (Dangerous Than A Whole In Heart) (https://turcomat.org/index.php/turkbilmat/article/view/5983)

Dr K. V. V. Raaju, et. al.

940-946

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5983/4982)

Agricultural Product Safety: Vertical Farm Project Concept (https://turcomat.org/index.php/turkbilmat/article/view/5984)

Zhaina Zhanaykyzy TOLEGEN, et. al.

947-950

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5984/4983)

Status of youth in Mexico and drug trafficking. Binomial of the emergence of a subculture (https://turcomat.org/index.php/turkbilmat/article/view/5985)

Mijael Altamirano Santiago, et. al.

951-957

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5985/4984)

Innovation in the platform of the Distance Education System in the Academic Division of Economic-Administrative Sciences of the Universidad Juárez Autónoma De Tabasco (https://turcomat.org/index.php/turkbilmat/article/view/5986)

Cristian Guadalupe Culebro Estrada, et. al.

958-967

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5986/4985)

Rach Cat Fort - The Largest French-Built Strategic Fort In Vietnam In Early 20th Century (https://turcomat.org/index.php/turkbilmat/article/view/5987)

Luu Van Quyet, et. al.

968-975

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5987/4986)

Islamic Worldview Conceptions of Muhammadiyah Elementary School East Java Teacher on the Leadership of the Principal and Student Learning Outcomes (https://turcomat.org/index.php/turkbilmat/article/view/5988)

Sarwo Edy, et. al.

976-991

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5988/4987)

Rethinking the Implementation of Part, Whole and Imagery Learning Methods: Comparison Analysis in Basketball Games (https://turcomat.org/index.php/turkbilmat/article/view/5989)

Abdul Rachman Syam Tuasikal, et. al.

992-1004

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5989/4988)

Developing Learning Module Based On Local Wisdom To Improve Environmental Care Attitudes (https://turcomat.org/index.php/turkbilmat/article/view/5991)

Riska Septia Wahyuningtyas, et. al.

1005-1014

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5991/4989)

Self-Loosening Failure Analysis Considering Vibration Frequency: Experimental Study for the Spare Tire Carrier (https://turcomat.org/index.php/turkbilmat/article/view/5990)

Yohanes T. Wibowo, et. al.

1015-1024

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5990/4990)

Organizational Behavior Of Organizational Behaviors (Ocb) Through Strengthening The Quality Of Work Life, Professional Commitment, And Personality (https://turcomat.org/index.php/turkbilmat/article/view/5992)

Mikael Ajis , et. al.

1025-1036

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5992/4991)

Introduction Study Of Business Intelligence Hospital Medical Recording Data (https://turcomat.org/index.php/turkbilmat/article/view/5994)

Ai Rosita, et. al.

1043-1050

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5994/4993)

Market Price Signal Prediction Based On Deep Learning Algorithm (https://turcomat.org/index.php/turkbilmat/article/view/5995)

Ai Rosita , et. al.

1051-1057

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5995/4994)

The Socialization of The Sound System and The Study of Acoustic in The House of Workship (Mosque) (https://turcomat.org/index.php/turkbilmat/article/view/5996)

Ajeng Mayang, et. al.

1058-1064

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5996/4995)

Analysis Of Differences In Share Prices Before And In Covid-19 Pandemic Era(Case Studies In The Sub-Sector Of Telecommunications, Hotel And Tourism, Health, Bumn Finance, And Transportation Listed On The Indonesia Stock Exchange) (https://turcomat.org/index.php/turkbilmat/article/view/5997)

Vanny Christianti, et. al.

1065-1077

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5997/4996)

The Influence Of Product Quality And Price On The Purchase Decision At Kedai Coffe "Abraham And Smith" Bandung (https://turcomat.org/index.php/turkbilmat/article/view/5999)

Anggraeni, et. al.

1078-1083

PDF (https://turcomat.org/index.php/turkbilmat/article/view/5999/4997)

The Influence Of Product Innovation And Price On Customer Satisfaction In Halodoc Health Application Services During Covid-19 (Survey Of Halodoc App Users In Bandung In 2021) (https://turcomat.org/index.php/turkbilmat/article/view/6000)

1Didi Tarmidi, et. al.

1084-1091

Turkish Journal of Computer and Mathematics Education Vol.12 No.11 (2021), 1005-1014

Research Article

Developing Learning Module Based On Local Wisdom To Improve Environmental Care Attitudes

Riska Septia Wahyuningtyas[1], Familia Novita Simanjuntak[2], Marina Silalahi[3], Fajar Adinugraha[4], Adisti Ratnapuri[5], Sunarto[6]

[1]Universitas Kristen Indonesia
[2]Universitas Kristen Indonesia
[3]Universitas Kristen Indonesia
[4]Universitas Kristen Indonesia
[5]Universitas Kristen Indonesia
[6]Universitas Kristen Indonesia
[1]riska28septia@gmail.com

Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 10 May 2021

Abstract: This research aimed to develop a module of environmental pollution based on local wisdom in Gunungkidul to improve the environmental care attitude of junior high school students. This research was a R&D (Research and Development). The development of this module adapted the steps of R&D research according to Sugiyono (2016), which was namely potential and problems, data collection, product design, design validation, design revision, product testing, product revision, usage trials, mass production. This first year research only covered potential problems, data collection, product design, design validation, and design revision. This module was created by placing indicators of environmental care attitude on each subject. Indicators of environmental care attitude include having awareness and gratitude for the culture; they had that must be maintained and preserved to protect the environment from pollution; they had curiosity, critical, and care about the environment in identifying the impact of environmental pollution; they had curiosity, critical, and care for the environment in identifying the impact of environmental pollution, and they must using our nature wisely and maintaining the balance of the ecosystem in the surrounding environment. The students' environmental care attitude would also develop by placing Gunungkidul's local wisdom in each module subject. The module got a very decent validation value in terms of material, media, and language.

Keywords: Module, Environmental Care Attitude, Local Wisdom.

1. Introduction

Environment is the most important place for student learning. Environment which is around students can get new knowledge that is not obtained at school. This new knowledge will always be remembered by students if it is obtained from the environment around them. The surrounding environment will provide contextual learning that makes an impression on students. The environment is one of the main parts of life. Without the environment we will not live. Learning through the environment will teach students to be more concerned about its sustainability.

The environment includes the social environment and the natural environment. The community environment has local wisdom that has been passed down from generation to generation. All generations have inherited local wisdom from their ancestors to always obey and practice this local wisdom. Children in millennial generation are also asked to be able to follow existing local wisdom without knowing what the logical reason is behind it. However, the millennial generation child will not remain silent, he will always try to find out the reasons behind the local activities.

Local wisdom in Gunungkidul is something that has positive values and has a logical message. However, millennial children today have not understood this and are only considered "superstition". To be able to introduce the logical value of a "superstition" to millennial children, it requires the role of school. One of the learning media modules, which is used by the teacher in delivering learning materials, must contain local wisdom. The local wisdom of the community is packaged in a learning media module to be able to convey logical messages and relate to the material studied in school.

The practice of local wisdom in the people of Gunung Kidul Yogyakarta, for example, is the tradition of treating trees and rivers as life worthy of respect (sacred) so that sarong and flower offerings have been carried out from generation to generation since their ancestors. In fact, this practice has had a positive impact on environmental protection both for forests and for rivers, for example preventing people from littering around the trees or rivers for fear of receiving punishments which are often beyond human reasoning. The punishment is often attributed to an astral or invisible figure waiting for the tree, forest or river.

Punishment beyond human reasoning makes humans dare not disturb nature. Humans will not dare to cut trees and open forest land if there are offerings in the form of flowers placed around it. Humans do not dare to approach the tree and even touch it if there is already a white cloth wrapped around the tree trunk. Humans will not dare to

throw trash in the river if there are flower offerings floating in the river or placed around it. All forms of offerings, incense, and white cloth used to cover the body of the tree are Gunungkidul local wisdom which has a logical message.

This local wisdom is an effort to tackle environmental pollution in the Gunungkidul area. This is also supported by previous research, namely according to Murdiati's (2015) research, forest preservation can be maintained because the community has sacred the existence of forests in Gunungkidul. Delivering local wisdom to tackle environmental pollution to students will be effective if it is delivered in an environmental pollution learning module. Based on this phenomenon, this study intends to develop a module of environmental pollution based on local wisdom in order to increase environmental awareness among junior high school students. An attitude of caring for the environment can help students to take pro-environmental actions and if it is developed sustainably, students can improve their attitudes to be able to love the environment and protect the environment from all forms of pollution.

Environmental care is an attitude that is expected to develop in a child from an early age. Children as the nation's next generation must have a high environmental care attitude. Without this attitude, the environment will be destroyed in a matter of years because future generations do not care and only want to exploit natural resources from the environment. A damaged environment will make human generations also become extinct. Therefore, an attitude of caring for the environment really needs to be instilled in students through learning activities. Learning activities that instill a caring attitude towards the environment will help the world to exist and the environment to remain sustainable. Through this research activity, a caring attitude towards the environment is expected to grow and develop through modules that are made by placing indicators of environmental care attitudes in each activity.

This research was conducted at 2 of junior high schools in Gunungkidul, namely MTs YAPPI Mulusan and MTs Muhammadiyah Monggol. The school is a school that is proposed to be an Adiwiyata school. Adiwiyata is a program to make shool to be helath, clean, and green school. Adiwiyata give the appreciation to the best school that can complete the task of Adiwiyata school. By implementing this module that will be made, the school will be assisted in assessing Adiwiyata schools. Students will also be formed an environmental care attitude to tackle pollution. All of these things can improve the image of Adiwiyata school. Thus, it is necessary to develop an integrated science learning module with environmental pollution material based on the local wisdom of the people of Gunungkidul Yogyakarta to be able to develop a caring attitude towards junior high school students in Gunungkidul.

2. Methods

The research method used for research on the development of the Gunungkidul Local Wisdom-based Environmental Pollution module to improve environmental care is adapting R&D research steps according to Sugiyono (2016), namely potential and problems, data collection, product design, design validation, design revision, product testing. , product revisions, trial use, mass production. However, this first year research only covers potential problems, data collection, product design, design validation, and design revision. For the second year of research, only do product trials, product revisions, use trials, and even mass production

Place and time of research

Place of research: Junior high school in Gunungkidul area. The school includes schools that are used as Adiwiyata candidates in the Gunungkidul area which include MTs YAPPI Mulusan and MTs Muhammadiyah Monggol.

Time of study: May 2020 - May 2021

Population and Sample Research

The population in this study were all junior high schools in Gunungkidul which were used as candidates for Adiwiyata schools. The sample in this study were 2 schools which were used as candidates for the Adiwiyata school in Gunungkidul which were taken by random sampling. The research sample was MTs YAPPI Mulusan and MTs Muhammadiyah Monggol.

Research Instruments

The instrument in this study was a questionnaire on the feasibility of language, the feasibility of the material, and the feasibility of the media which were arranged on a Likert scale.

Data analysis

According to Arikunto (2010), quantitative data in the form of calculated numbers can be processed by adding up, compared to the expected amount and the percentage obtained.

The data that has been obtained is then calculated by the formula (Arikunto, 2010) as follows:

$$P = \frac{f}{n} \times 100\%$$

Keterangan :

P = Persentase

f = The number of scores obtained

n = Total maximum score

The result of the percentage score will be converted based on the following criteria:

Table 1. Eligibility criteria for student worksheet

Score (%) Criteria

Score **(%)**	Criteria	
61 - 100%	Very feasible	VF
41- 60%	Eligible	E
21- 40%	Fairly feasible	FF
0- 20%	Not feasible	NF

Source: Arikunto, 2010

The feasibility score of the module worksheets is assessed on the highest scale very feasible and the lowest scale not feasible.

Research Steps

The research steps to be carried out are described as follows:

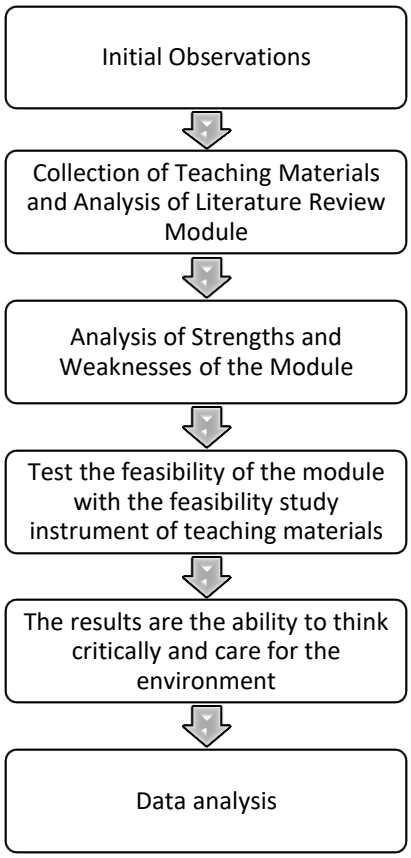


Figure 1. Research steps
Source: private documentation

3. Results and discussion

The results of this study are the results of research and development (R&D) with steps starting from finding potential and problems, collecting data, designing products, validating designs, to design revisions. The results of development research are focused on the results of the validator's assessment and the input of the validator and module users. Validators are carried out by material experts, media experts, and language experts.

The initial step of development research is to find potentials and problems. The discovery of potential is carried out in several stages according to Sugiyono (2015), namely

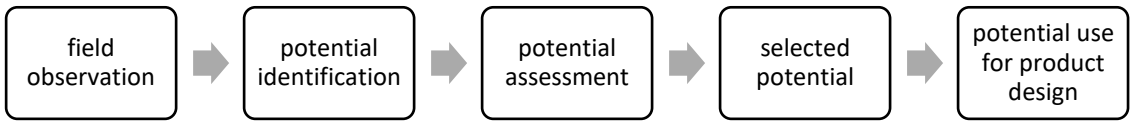


Figure 2. Steps of potential discovery
Source: Sugiyono (2015)

Observations were made in Gunungkidul district when there were traditional ceremonies of rasulan and babad dalan in the villages of Giring and Sodo. When researchers looked at a series of traditional ceremonies and local wisdom activities in Gunungkidul, the researcher found a potential that there was a need for the preservation of cultural activities and students in schools needed to find out about it by pouring into learning activities. Local kerifan and traditional activities in Gunungkidul will be conveyed to students by pouring it into the learning module. The potential for cultural preservation is selected and will be included in the learning through the module. Then the researchers looked for Basic Competencies in the 2013 Junior High School Curriculum that were compatible with the culture in the Biology subject. Researchers then found the material in KD Environmental pollution. This local wisdom is an effort to tackle environmental pollution in the Gunungkidul area. The delivery of local wisdom to tackle environmental pollution to students will be effective if it is delivered in an environmental pollution learning module. Based on this phenomenon, this study intends to develop a module of environmental pollution based on local wisdom in order to increase environmental awareness among junior high school students. According to Wahyuningtyas (2019) that the implementation of local wisdom in the surrounding environment in learning in schools will be able to improve higher-order thinking skills. Higher order thinking skills are related to students' perceptions of being able to care about nature. Students with good high-level thinking skills will be able to understand the importance of the natural surroundings, so that a caring attitude towards their environment will emerge.

An environmental care attitude which is based on good local wisdom knowledge can help students to take pro-environmental actions and if it is developed sustainably, students can increase students' environmental care attitudes towards their surroundings. The selected potentials are local wisdom, cultural customs, traditions, and environmental care that will be used as potentials for module design.

This research was conducted at 2 Junior High School in Gunungkidul, namely MTs YAPPI Mulusan and MTs Muhammadiyah Monggol. The school is a school that is proposed to be an Adiwiyata school. By implementing this module that will be made, the school will be assisted in assessing Adiwiyata schools. Students will also be formed an environmental care attitude to tackle pollution. All of these things can improve the image of Adiwiyata school. Thus, it is necessary to develop an integrated science learning module with environmental pollution material based on the local wisdom of the people of Gunung Kidul Yogyakarta to be able to develop a caring attitude towards the environment in junior high school students in Gunungkidul.

The second step of this research is to collect data. The data collected in the form of photos of local wisdom in Gunungkidul that support the design of the module, interviews with local village customary leaders who

understand local wisdom in Gunungkidul, then interviews with teachers and school principals regarding what kinds of activities students would easily do in a module to get to know local local wisdom and develop an environmental care attitude.

These data will be used to be able to design learning activities in the module by emphasizing indicators of environmental care attitudes in each activity. Local wisdom in Gunungkidul is something that has positive values and has a logical message. However, millennial children today have not understood this and are only considered "superstition". To be able to introduce the logical value of a "superstition" to millennial children, it requires the role of school. One of the learning media modules, which is used by the teacher in delivering learning materials, must contain local wisdom. The local wisdom of the community is packaged in a learning media module to be able to convey logical messages and relate to the material studied in school.

The practice of local wisdom in the people of Gunungkidul Yogyakarta, which treats trees and rivers as life worthy of respect (sacred) so that sarong and flower offerings have been carried out from generation to generation since their ancestors. In fact, this practice has had a positive impact on environmental protection both for forests and for rivers, for example preventing people from littering around the trees or rivers for fear of receiving punishments which are often beyond human reasoning. The punishment is often attributed to an astral or invisible figure waiting for the tree, forest or river.

Punishment beyond human reasoning makes humans dare not disturb nature. Humans will not dare to cut down trees and open forest land if there are offerings in the form of flowers and menyan placed around the place. Humans do not dare to approach the tree and even touch it if there is already a white cloth wrapped around the tree trunk. Humans will not dare to throw trash in the river if there are flower offerings floating in the river or placed around it. All forms of offerings, incense, menyan, and cloth used to cover the body of the tree are Gunungkidul local wisdom which has a logical message.

The third step of this development research is product design. Product design is done based on the potential and problems that are obtained. From the potentials and problems, data will be collected to carry out product design. The product design in this module is to put every indicator of environmental care. According to Dewi (2015: 191-195), environmental care attitude indicators used in this research include having awareness and gratitude for the culture that is owned must be maintained and preserved to protect the environment from pollution, have curiosity, are critical, and care for the environment. in identifying the impact of environmental pollution, being curious, critical, and caring for the environment in identifying the impact of environmental pollution, as well as using our nature wisely and maintaining the balance of the ecosystem in the surrounding environment. This indicator is contained in every activity in the environmental pollution module. It is hoped that with this indicator, the module can develop and improve students' environmental care attitudes. The explanation per indicator outlined in each activity in the module is as follows

1. Having awareness and gratitude for the culture they have must be maintained and preserved to protect the environment from pollution

In this indicator, each activity in the first step module is that students are directed to know what culture is around them. After students know all the cultures and traditions around them, they are asked to name what is done in that custom, culture, or tradition. By knowing every step of their customs, culture, and traditions they are directed to be able to have awareness and gratitude for the culture they have done every year. The culture they do is not a bad act, but it is an ancestral heritage that has unique values and good intentions that we should preserve.

2. Have curiosity, criticality, and care for the environment in identifying the impact of environmental pollution

Activities in this indicator students are directed to 2 incidents in the area where they live, namely polluted and uncontaminated conditions. The contaminated condition will invite the child to analyze who caused the contaminated condition. If the condition is polluted, will local wisdom products such as ungkrung, fried grasshopper, and tiwul still exist. This activity will lead students to identify environmental pollution that will harm themselves and others.

3. Having curiosity, criticality, and care for the environment in identifying the impact of environmental pollution, as well as using our nature wisely and maintaining the balance of the ecosystem in the surrounding environment.

Students' critical thinking skills are highly demanded on this third indicator, students are asked to be able to assess a tradition against environmental pollution. Is the tradition of, for example, giving offerings in rivers, forests, and around large trees to help the place not to be damaged by people? By identifying these traditions, students will

be able to find the good values behind the traditions, customs, and cultures that exist around society today. The good grades will be processed by students with their critical thinking skills to be a tool to maintain the balance of the natural surroundings. Then students will be able to conclude that local wisdom in the Gunungkidul area will be able to help nature avoid environmental pollution.

In addition to indicators of environmental care, local wisdom and Gunungkidul customs are always used as a reference in carrying out activities in the module. This is intended so that students can connect the customs around them with environmental conservation material in the module. By knowing the relationship between 2 potentials, namely local wisdom carried out as an effort to overcome environmental pollution, it is hoped that students can sharpen their environmental care attitude. For example, the activities in the module are as follows:

KEGIATAN 2 (BERPIKIR KRITIS INDIKATOR)

Sumber : Gambar 1 dan 3 www.kabar handayani.com

Figure 3.Clean river (left), dirty river (right), and offerings in the river (bottom)
Source: www.kabarhandayani.com

Gunungkidul local wisdom products in the form of offerings can be connected to clean and polluted rivers. Seeing the offerings placed in the river as a form of local wisdom in Gunungkidul makes residents afraid to pollute the river because if they pollute the river, the creatures given the offerings will get angry and disturb the villagers. This is packaged in activities based on indicators of environmental care. The activity of linking the three photos must contain indicators of having awareness and gratitude for the culture that is owned must be maintained and preserved to protect the environment from pollution; have curiosity, critical, and care about the environment in identifying the impact of environmental pollution; have a curiosity, are critical, and care about the environment in identifying the impact of environmental pollution, as well as using our nature wisely and maintaining the balance of the ecosystem in the surrounding environment. Therefore, a module designed like this is expected to develop a caring attitude towards the environment. The module effectiveness test for developing a caring attitude towards the environment will be carried out in the second year at Junior High School in

Gunungkidul.

The module design is also compiled containing several topics, namely

1. Introduction or Environmental Pollution Practices associated with the slogan Gunungkidul Hamemayu Hayuning Buwana as one of the slogans of local wisdom
2. Definition of Environmental Pollution
3. Types of Environmental Pollution include Water Pollution, Soil Pollution, Air Pollution
4. Factors that cause water pollution, soil pollution, air pollution
5. Impact of Water Pollution, Soil Pollution, Air Pollution

The design of this module will be used to support the research objectives, namely to develop a module on environmental pollution based on local wisdom that can develop a critical thinking attitude. It is emphasized that a critical thinking attitude is always carried out in all module activities using indicators of critical thinking in the preparation of each activity in the module. The first module activity is definitely based on having awareness and gratitude for the culture that is owned must be maintained and preserved to protect the environment from pollution, have curiosity, are critical, and care about the environment in identifying the impact of environmental pollution,

have curiosity, are critical, and care for the environment in identifying the impact of environmental pollution, as well as using our nature wisely and maintaining the balance of the ecosystem in the surrounding environment.

The fourth step in this development research after product design is design validation. This design validation contains 2 stages according to Paidi (2011), namely validation and internal review from senior lecturers and colleague lecturers as well as external validation and review from teachers and students involved as module users.

Table 1. Recapitulation of Validation Results from Linguists

Aspect	No.	Category	Percentage	Statement
	1	Module has an attractive design	100 %	VF
	2	The module contains interesting pictures, so that students are interested in learning	100 %	VF
	3	The module provides practicum instruction sheets and practicum results so that students are helped in doing practicum	100 %	VF
	4	Modules use matching writing colors so they are not boring	90%	VF
	5	Module provides space for writing identities and has been arranged in position	89 %	VF
	6	The module provides activities so that students can be active in classes	100 %	VF
	7	Modules have interesting activities	100 %	VF
	8	Module uses activities in the environment as part of the material in the module	100 %	VF
presentation	9	Modules use material that is combined with practicum activities	100 %	VF
	10	Modules have clear writing	100 %	VF
	11	Modul memiliki gambar yang variatif	85 %	VF
	12	Module displays an image size that corresponds to a font size	81%	VF
	13	The module has a font size that corresponds to paper size	80%	VF
	14	The module has an image size that fits paper size	80%	VF
	15	Module has an attractive cover	85%	VF

Table 2. Recapitulation of Validation Results from Material Experts

Aspect	No.	Category	Percentage	Statement
Good and correct Indonesian Language	1	Module uses the rules of Indonesian that are good and correct	85 %	VF
	2	The module presents material, questions of understanding using language that can be understood by	87 %	VF
	3	Module uses Enhanced Spelling (EYD) rules well	85 %	VF
	4	The module uses Enhanced Spelling according to the guidelines it should be so as to help students understand the material	83 %	VF
Terminology	5	Module uses terminology that is in accordance with the concept which is the subject of	87 %	VF
	6	The module uses sentences in accordance with the Environmental Pollution material so that students easily understand the material	87 %	VF
	7	Modules use consistent sentences	100 %	VF
	8	The module presents sentences according to Indonesian grammar that are good and correct in	100 %	VF
Language Conformity	9	Modules use language in accordance with the development of students	85 %	VF
	10	Modules present material in language that is easily understood by students	88 %	VF
	11	The module uses a sentence structure in accordance with the cognitive mastery of students	85 %	VF
	12	Modules use sentences that are easily understood by students	96 %	VF
	13	Modules use communicative language	90 %	VF
	14	Modules use language that is effective and efficient	92 %	VF
	15	Modules using dialogue or interesting words	83 %	VF

Validation and review get results in the form of a percentage value of eligibility and input. Validation and review were carried out in terms of material, language and media.

The modified validation questionnaire from Nurul Hidayah's (2011) questionnaire and the results of the media validation are summarized as very feasible (VF), the results of the validation of the language are very feasible, and the results of the validation of the material are summarized as very feasible. These results are presented in Table 1, Table 2, and Table 3. All module assessment categories are summarized asVF (very feasible).

The fifth step of this development research is design revision. Design revisions are made from the results of validation and reviews by material, media and language experts. The results of internal and external validation will be carried out as a basis for revising the design. The design revision in the environmental pollution module based on local wisdom to develop a caring attitude towards the environment includes a summary of input from internal and external velidators and reviewers

Feedback	Follow up
1. More adapted to the abilities of children in grade 7	1. Make activities simpler so that grade 7 junior high school students can understand them easily
2. The material sometimes exceeds the basic competency limits of environmental pollution for grade 7 junior high school students.	2. Make activities simpler so that grade 7 junior high school students can understand them
3. Please provide lesson plans that can be used by the teacher in using the module to make it more focused	3. Prepared lesson plans to complement the module in guiding teachers to implement the module

Table 3. Recapitulation of Validation Results from Media Experts

Aspect	No.	Category	Percentage	Statement
Material coverage	1	The depth of the material in the module is in accordance with the development of students	85 %	VF
	2	Completeness of the material in the module according to the development of students	80 %	VF
	3	The accuracy of the material presented in the Module corresponds to everyday life	87 %	VF
	4	The basic concept of the material in the Module is in accordance with the concept of Environmental Pollution	100 %	VF
	5	Modules have material that is easy to understand	85 %	VF
	6	Modules have material that adds to the knowledge of students	100 %	VF
	7	The module contains materials that use local wisdom of Gunungkidul	100 %	VF
	8	Modules have material presented in order of	92 %	VF
	9	Modules have complete material	88 %	VF
suitability of Based Competence dan Main Competence of 2013 Curiculum	10	Relevansi tujuan pembelajaran pada Modul sesuai dengan Based Competence dan Main Competence 2013 Curiculum	85 %	VF
	11	The conformity of the material on the Module with the syllabus	100 %	VF
	12	The conformity of the material in the Module with Based Competence dan Main Competence of 2013 Curiculum	100 %	VF
	13	Consistency of questions and answers in the module according to Based Competence dan Main Competence of 2013 Curiculum	92 %	VF
Meaningfulness	14	The module which uses local wisdom material is meaningful for students	98 %	VF
	15	The material provides motivation for students to do things that are useful	98 %	VF

a. Media :

Follow up	feedback
1. Some of the sentence questions need to be reviewed, in the data analysis section of the activity.	1. Improved sentence questions in the activity section of the module will be improved to attract students and make it easier for students to understand.
2. Addition of overall conclusions at the end of the module activity.	2. The author adds the final conclusion at the end of the module
3. Added instructions for using the module	3. The author makes instructions for using the module on the home page before entering the subject of environmental pollution
4. Improved citation of pictures	4. The author improves the citation of the image

b. Linguistic

Follow up	feedback

1. The language used is sometimes not standardized and contains regional languages	1. Language will change to standard Indonesian and according to EYD
2. The use of terms is inconsistent sometimes there is a term 1 meaning written in English sometimes Indonesian	2. The terms will be consistent into Indonesian terms

Revision of the Module Design will be carried out by referring to the follow-up of the input from the validators and reviewers. This module has been categorized as very feasible, so this module can be used as a learning medium to help teachers carry out teaching and learning activities (Nurahmi, 2017). Henceforth, in the second year of research after the module design is revised, limited testing, design revision, large-scale testing, and mass production will be carried out to make the module more feasible and mass produced as a credible teaching material.

4. Conclusion

This research and development has produced a learning tool in the form of an Environmental Pollution module based on local wisdom to improve a very proper environmental care attitude. The feasibility value has an average of 89% in terms of language, in terms of material 93%, and in terms of media 93%. All of these values indicate that the module is very feasible. This module can be applied in learning biology at SMP / MTs to increase environmental awareness.

References

1. Arikunto, S. 2010. Prosedur Penelitian Suatu Pedekatan Praktik. Jakarta: Rineka Cipta.
2. Faiz, Fahrudin. 2012. Thinking Skill: Pengantar Berpikir Kritis. Yogyakarta: SUKA Press.
3. Hidayah, Nurul. 2017. PENGEMBANGAN LEMBAR KEGIATAN SISWA (LKS) GUIDED DISCOVERY PADA MATERI FUNGI UNTUK MENINGKATKAN KETERAMPILAN PROSES SAINS SISWA KELAS X MIA SMA N 1 PRAMBANAN. Skripsi. Yogyakarta: FMIPA UNY
4. Johnson, Elaine B. 2009. Contextual teaching and learning: menjadikan kegiatan belajar mengajar mengasyikkan dan bermakna. Bandung: Mizan Learning Center.
5. Koftan, J. E. 2015. Penelitian Sikap dan Perilaku Siswa. Jakarta: PT Bumi Aksara.
6. Mungmachon, R. 2012. Knowledge and Lokal Wisdom: Community Treasure. International Journal of Humanities and Social Science. Vol. 2 No. 13. Juli 2012
7. Gunawan, R., Murniarti, E., & Male, H. (2020). Teacher's perception of physical, verbal, and nonverbal bullying behavior in elementary school.
8. Murdiati, dkk. 2015. POTENSI KEARIFAN LOKAL MASYARAKAT ADAT DESA BEJI KECAMATAN NGAWEN GUNUNG KIDUL DALAM MELESTARIKAN HUTAN ADAT WONOSADI. E-Journal UAJY. Yogyakarta: UAJY
9. Nurahmi, Rifka. 2017. PENGEMBANGAN MODUL BERBASIS KEARIFAN LOKAL DAERAH ISTIMEWA YOGYAKARTA TEMA PENDIDIKAN UNTUK SISWA KELAS III SEKOLAH DASAR. Skripsi. Yogyakarta: UNY
10. Paidi, Paidi. 2011. Pengembangan Perangkat Pembelajaran Biologi Berbasis Masalah. Jurnal Kependidikan Volume 41 No 2. Yogyakarta : UNY
11. Paidi, Paidi. 2013. Pengembangan Perangkat Pembelajaran Biologi Berbasis Masalah Untuk Pemberdayaan Kemampuan Berpikir Tingkat Tinggi (HOTS) Tingkat SMA. Laporan Tahunan Hibah Penelitian Pascasarjana. Yogyakarta : UNY
12. Prastowo , Andi. 2012. Panduan Kreatif Membuat Bahan Ajar Inovatif. Yogyakarta: Diva Press.
13. Richey, R. C., & Klein, J. 2007. Design and Development Research: Methods, Strategies, and Issues. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.
14. Salim, Emil. 2016. Pembangunan Berwawasan Lingkungan. Jakarta: LP3ES.
15. Suter, W.N. 2012. Introduction to Education Research : A Critical Thinking Approach. Second Edition. SAGE Publication.
16. Wahyuningtyas, Riska S. 2019. Meningkatkan Kemampuan Berpikir Tingkat Tinggi Mahasiswa Pada Materi Bioteknologi Melalui Model Cooperative Learning Dipadu Dengan Group Project Berbasis Budaya. Jurnal Dinamika Pendidikan 12 (2), 99-112. Jakarta : UKI