Al-Ishlah: Jurnal Pendidikan
Vol.16, 1 (March, 2024), pp. 581-591
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v16i1.4639

Implementing the Concept of Integration of Science and Islamic Values at Islamic University

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ARTICLE INFO

Keywords:

integration of Islamic values;
science;
implementation;
evaluation

Article history:

Received 2023-09-07
Revised 2023-11-26
Accepted 2024-03-26

ABSTRACT

The integration of scientific principles within Islamic religious universities governed by the Ministry of Religion is a widespread practice. However, the application of this concept across universities offering programs under the auspices of both the Ministry of Education and the Ministry of Religion remains unexplored. This study delineates the framework for integrating scientific knowledge at an Islamic University in Madura, focusing on the execution and assessment of education that amalgamates scientific insights and Islamic values. Employing observational techniques on policy documents and teaching resources of instructors, alongside semi-structured interviews with fifteen educators from the physics, biology, and mathematics departments, this investigation reveals a unique five-pillar knowledge integration concept. These pillars encompass Islam, Indonesia, Islamic Boarding School, Madura, and Aswajaan perspectives. The formal documentation supporting this integration at Madura Islamic University is encapsulated within its Statutes and chancellor's guidelines for curriculum enhancement. Evidence of implementation is observed in instructors' Syllabus and teaching materials, albeit only 53.3% have successfully linked scientific content with Qur'anic verses. The primary challenge identified is the considerable time required to develop materials that effectively integrate Islamic values. Solutions proposed include the creation of a comprehensive guide for integrating the five knowledge pillars and extensive training for all faculty members to facilitate this integration process.

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1. INTRODUCTION

The relationship between science and religion has become a research trend in the last few decades. This research was initiated by Billingsley in 2009 in the project Learning About Science And Religion

(LASAR) and has been followed by other research (Billingsley et al., 2013; Abdullah, 2014; Cuzzolino, 2021; Dumler-Winckler, 2019; Erduran, 2020; García-Magariño et al., 2023; Lessl, 2022; Marin & Lindeman, 2021; May et al., 2022; Park et al., 2022; Pearce et al., 2021; Trubody, 2019). One of the interesting research findings is that science and religion can be integrated. This finding is reinforced by the fact that the majority of students have an interest in learning more deeply about the relationship between science and religion. (Billingsley et al., 2013). Science and religion can be integrated because science is part of religious knowledge (Mansour, 2011; Reiss, 2010) So beliefs about the relationship between science and religion have an impact on science teaching and learning (Taber, 2017).

In line with that, the Indonesian government has a national education policy in the form of the need to develop the universal potential of students based on belief in God, namely creating people who have faith, are devoted to God Almighty, have noble character, are healthy, knowledgeable, capable, creative, independent and responsible (Kemdikbud, 2003). In line with this, the Ministry of Religion of the Republic of Indonesia, through the Director General of Islamic Education, has issued Decree Number 2498 of 2019 concerning guidelines for implementing knowledge integration in Islamic Religious Colleges (IRC) (Kementerian Agama, 2021). This suggests that all Islamic religious universities are required to develop a concept of knowledge integration, including in IRC. In the context of the integration of general science and religion, in the last few decades, there has been a research trend on the relationship between religion and science which has revealed integration efforts between science and religion (Abdullah, 2014; Billingsley & Fraser, 2019; Cuzzolino, 2021; Erduran, 2020). For this reason, the form of integration of science and Islamic values at UIM, which organizes science and Islamic religious science study programs, will be easy to implement as a mandate from the ministry of religion. The integration of Islamic values in science has shown to be effective in improving various aspects of learning, both in terms of learning quality and learning outcome (Gloria, 2016; Husna et al., 2020; Insiyyah et al., 2020; Khoiri et al., 2017; Mudhofir et al., 2018; Ramdhan et al., 2020; Zain & Vebrianto, 2017).

In the context of learning science in an IRC, one way that can be done to create meaningful learning is to integrate learning with Islamic values (Purwaningsih et al., 2023; Sollereder, 2019). For this reason, a greater portion of religious learning at Madura Islamic University/Universitas Islam Madura (UIM) will make a good contribution to learning the integration of science and Islamic values, a strong religious background will make it easier to achieve the implementation of learning integration of science and Islamic values (Hamdan et al., 2017; Iksan et al., 2016; Kim & Hamdan Alghamdi, 2020; Mansour, 2011; Ramdhan et al., 2020; Sumarni et al., 2020). In this way, the implementation of integrated science and Islamic values learning at UIM will be more easily accepted by students. Research on the concept of integrating Islamic religious knowledge in higher education has been carried out (Fatmawati, 2018; Fitriyawany et al., 2022; Hakim et al., 2020; Jamal, 2017; Khoiriyah, 2021; Nugraha, 2020; Rochman, 2010).

Building on prior research that has explored various models of integrating scientific knowledge within Islamic educational frameworks, such as the Tree of Knowledge at the State Islamic University of Maulana Malik Ibrahim Malang, the Integrated Twin Towers at the State Islamic University of Sunan Ampel Surabaya, and the Spider Webs concept at the State Islamic University of Sunan Kalijaga Yogyakarta, this study ventures into previously uncharted territory. Notably, Irmalasari (2018), Jannah (2020), Priyanto (2014), Rochman (2010), and Sari & Amin (2020) have contributed to understanding the practical applications and assessments of such integrations. Despite these advancements, a gap remains in the exploration of scientific and Islamic value integration within universities that fall under the joint auspices of the Ministry of Education and Culture and the Ministry of Religion. This research aims to bridge this gap by examining the integration model at Madura Islamic University and assessing the incorporation of Islamic values in the science curriculum, specifically within physics, biology, and mathematics education programs.

2. METHODS

Employing a qualitative research design with a case study approach, this investigation delved into the nuanced integration of scientific knowledge and Islamic values at Madura Islamic University (UIM), specifically within the disciplines of physics, biology, and mathematics education. This methodological choice, inspired by Sari & Amin (2020) for its focused and in-depth exploratory potential as outlined by Jannah (2020), allowed for a concentrated examination of the science departments at UIM. The data-gathering process encompassed both document observations and semi-structured interviews. Observations targeted policy documents related to the scientific integration at UIM, as well as the teaching plans (RPS) of lecturers within the aforementioned science programs, to discern the structural framework and content alignment with Islamic values. Concurrently, semi-structured interviews with faculty members unveiled the practical challenges, strategies for overcoming these challenges, and aspirations related to the implementation of this integrative educational model. The interview protocol was adapted from established frameworks by Chanifudin & Nuriyati (2020) and Mutma'inah (2017), ensuring a comprehensive understanding of how Islamic values are woven into science education. The findings from this research were qualitatively analyzed, offering rich insights into the lived experiences of educators at the forefront of this educational innovation.

3. FINDINGS AND DISCUSSION

3.1 Concept of Scientific Integration

UIM Pamekasan is a private university in Madura which is under the auspices of the Madura Islamic University Foundation (YUNISMA) and is located in the Miftahul Ulum Bettet Pamekasan Islamic Boarding School, East Java. UIM has a scientific integration concept, namely "**Five Towers of Science**". The concept of the Five Towers of Science consists of KeIslaman, keIndonesiaan, KePesantrenan, KeMaduraan, and keAswajaan.

Figure 1. Concept of Five Towers of Science

Information:
KeIslaman (Islamic), *KeIndonesiaan* (Indonesianness), *KePesantrenan* (Islamic boarding school culture), *KeAswajaan* (The followers of AlSunna and Algamaa), *KeMaduraan* (Madurese soul), *Pendidikan dan*

Pengajaran (Education and Teaching), *Penelitian* (research) and *Pengabdian kepada Masyarakat* (Community service).

Based on Figure 1, it can be seen that Islam is a strong foundation for the 4 concepts above. This foundation always functions to strengthen the science building above it as needed, and at the same time, acts as a support for the strength of all parts related to the science tower building. Therefore, the concept of the five UIM Science Towers has a main foundation, namely Islam as a belief, teaching and guidance, transforming it into a structure of academic and non-academic norms in the form of keIndonesiaan, KePesantreanan, keMaduraaan, and keAswajaan values as a basis for designing and developing education and teaching, research and community service.

3.2 The Concept of Integration Learning in the UIM Policy Document

The concept of integrated learning at UIM, called the five Towers of Knowledge, is contained in policy documents, namely in the UIM Statutes and the UIM Curriculum Preparation Guidelines. The UIM Statutes are basic guidelines for implementing the Tri Dharma of Higher Education through educational and teaching activities, research and development and community service. The Madura Islamic University Foundation established UIM, which is quite representative of the development of science, technology, culture, and arts. UIM has a strong desire to produce graduates, scientists, experts and ulama who are skilled in their fields, intelligent, personable, independent and have a sense of social and Islamic responsibility based on the values of Ahlus Sunnah Wal Jamaah, to increase faith and devotion to Allah SWT and have good morals within the frame of the Madura Islamic University's tower of knowledge, namely keIslaman, keIndonesiaan, kePesantrenan, keMaduraan and keAswajaan

The curriculum at UIM places the Science Tower as an institutional foundation. Menara Ilmu is the soul of a part of the philosophical foundation that can provide direction and goals for UIM's educational programs in order to produce graduates who have the maturity of Aqidah Islamiyah by adhering to the *Ahlussunnah Wal Jamaah* ideology which is reflected through polite attitudes and behavior characterized by Islamic boarding school values and upholding Madurese local wisdom and Indonesian. The Science Tower is the institutional foundation of the curriculum at UIM which is contained in the description or formulation of values and/or part of the study material that must be actualized in each study program. The concept of the Five Towers of Science is integrated into the UIM curriculum preparation document, both in terms of compiling institutional compulsory courses that are applied to each study program, as well as compiling Graduate Learning Outcomes (CPL) listed in the realm of attitudes and values, general and specific skills, as well as the realm of knowledge. Compulsory courses result from the formulation of study material based on the uniqueness of UIM with the concept of the Five Towers of Science produce courses including Aswaja Education, as well as Islamic Boarding Schools and Kemaduraan.

Based on the study of UIM curriculum documents, it can be seen that UIM has a characteristic attitude, namely being able to internalize Islamic boarding school values in behaving in society and developing religious moderation values, as well as internalizing Maduraan values in the form of *Bhupak Bhabuh Guruh Ratoh* (father, mother, teacher, leader) and *Tata*g (brave). Apart from the realm of attitudes and values, the general and specific skills in CPL in the UIM curriculum also apply the concept of the five Towers of Knowledge. The general skills that every UIM student must have are being able to transfer Islamic boarding school values as a personal or social obligation, as well as being able to maintain local wisdom and Madurese culture. Meanwhile, the special skills are being able to carry out religious practices such as *tawassuth, tawazun, tasamuh*, and I'tidal correctly, as well as being able to apply Islamic boarding school culture.

The integration of the five Towers of Knowledge is not only carried out in the realm of attitudes and skills, but is also integrated in the realm of knowledge/cognition. In the realm of knowledge, students are expected to be able to: 1) Apply the concepts of nationality, diversity, tolerance and love of the homeland, 2) Apply the concept of Islamic boarding school life and values, respect knowledge, respect teachers, and the spirit of preaching, 3) Apply the concept of keAswajaan in life daily life

personally and socially is based on tawassuth, tawazun, tasamuh, and I'tidal, 4) Applying the concept of keMaduraa in daily life personally and socially in the form of knowledge about *Bhupak Bhabuh Guruh Ratoh* (father, mother, teacher, leader) and *Tatag* (brave) . Based on the concept of integrated learning initiated by UIM, it is hoped that it can produce attitudes/values, knowledge and skills contained in the five towers of knowledge as characteristics of UIM graduates, namely *Keislaman* which is reflected through the maturity of *aqeedah*, depth of knowledge and nobility of character, *keIndonesiaan* which is reflected through diversity, tolerance and love of the country, *Kepesantrenan* which is reflected through respect for knowledge and teachers as well as the spirit of preaching, *keaswajaan* which is reflected through the attitudes of *tawassut, tasammuh, tawazzun* and *i'tidal,* as well as *kemaduraan* which is reflected through *jenilan* (interpreneur), *bhangal numpoh* (wander) and *atharetan semma' bhan jhau* (high kinship).

3.3 Implementation of Islamic Values Integration Learning

The study of the implementation and evaluation of learning to integrate Islamic values at UIM was obtained through observing lecturers' learning tools and structured interviews with 15 lecturers in the physics education study program, biology education study program and mathematics study program. Implementation of the integration of science and Islamic values was obtained from the RPS Lecturers, but only three lecturers (20%), then there were five (33.3%) lecturers who presented Islamic values in the learning material in class. The implementation and evaluation indicators are presented in Table 1.

Table 1. Indicators for implementation and evaluation of the integration of science and Islamic values

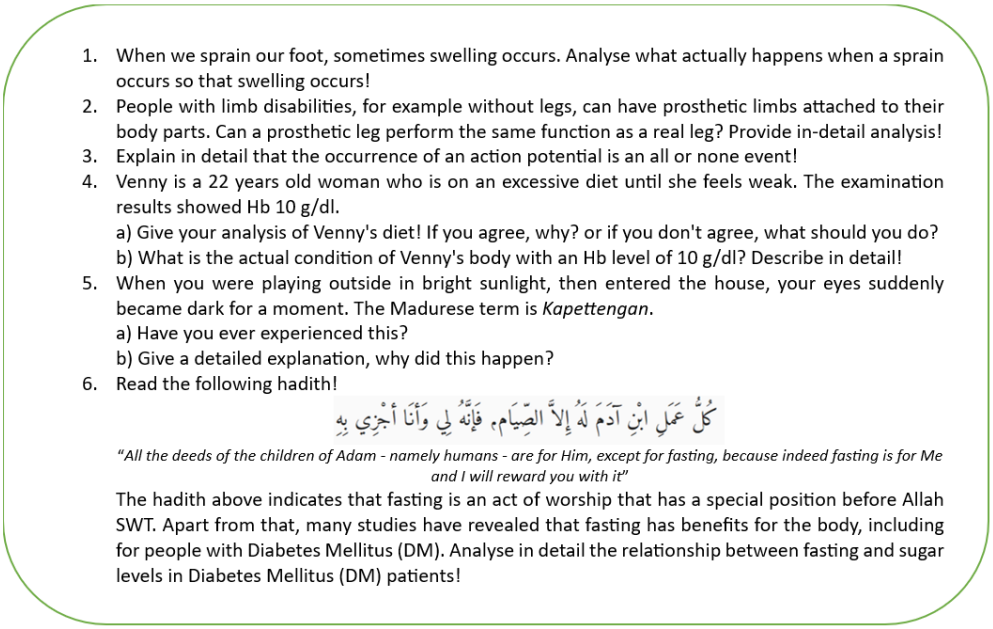
Integration	Indicator
Philosophy Level Integration	• The Al-Qur'an is positioned as the main source or basic foundation. • General knowledge obtained from the results of observation, experimentation, and logical reasoning has a position as a supporting source in order to increase belief in Allah. • Each study has fundamental value in relation to scientific disciplines and their relationship to humanistic science.
Integration of the Level of Research Methods and Approaches	The method used in developing science uses a certain approach, for example, with empirical experience, deductive thinking patterns (starting from the truth in Islam) and inductive (various scientific cases are drawn in relation to Islamic norms)
Material Level Integration	• Integrating universal truth values with Islamic studies. • Expanding the boundaries of Islamic study material and avoiding the dichotomy of knowledge.
Strategy Level Integration	• Apply various learning models and methods that are relevant to Islamic values, such as the values of wisdom, honesty, piety, purity, and morals. • relevant learning models, including: Inquiry, Case Method, Problem-based Learning (PBL), Project-based Learning (PjBL)
Evaluation Level Integration	Evaluation can be carried out through self-assessment and peer assessment.

The first evaluation in this research was that 8 (eight) out of 15 (fifteen) or 53.3% of lecturers had implemented the integration of science and Islamic values in learning in the form of making the Al-Qur'an the main source and basic foundation in developing each other's knowledge. Eight lecturers have carried out the implementation in the form of associating scientific concepts with the contents of the Qur'an. The next finding was that 66.6% of lecturers had carried out learning through reflection activities (from the results of observations, experiments and logical reasoning) in order to increase their belief in Allah. Furthermore, 100% of lecturers feel it is important to have fundamental values in relation to scientific disciplines and their relationship with humanistic sciences, and this is intended to increase our faith in a scientific way. As many as 66.6% of lecturers used a factual and contextual approach in learning the integration of science and Islamic values, this is intended to emphasize the

initial understanding that Islam does not conflict with science. An example of discussion material used by Biology Education lecturers in Human Anatomy and Physiology courses can be seen in Figure 1.

The indicator of universal truth is 66.6% of lecturers, emphasizing morals before knowledge, fighting spirit, critical thinking, collaboration, and communication. Furthermore, 100% of the lecturers agreed that there was no or avoided the scientific dichotomy, especially in science and Islam. As for learning methods that are relevant to Islamic values, for example, the values of wisdom, honesty, piety, chastity, and morals; starting from speaking good words, not lying, carrying out tasks with a sense of responsibility, directing students to behave with morality. The final finding in this study is that 100% of lecturers have implemented learning models in the form of inquiry, case method, problem-based learning (PBL), and project-based learning (PjBL), which are models that are relevant to Islamic values, because these models can hone and improve critical thinking skills to solve problems, communication skills, collaboration, and creativity, direct students towards the truth, but also develop social skills, such as collaboration, independence, and tolerance. Furthermore, this model is also able to facilitate Islamic values in the form of *hablum minannas* and increase our faith in a scientific way. The following is an interview excerpt from LTA:

> *The models mentioned above not only develop students' thinking skills, but also develop social skills, such as collaboration, independence, and tolerance.*



1. When we sprain our foot, sometimes swelling occurs. Analyse what actually happens when a sprain occurs so that swelling occurs!
2. People with limb disabilities, for example without legs, can have prosthetic limbs attached to their body parts. Can a prosthetic leg perform the same function as a real leg? Provide in-detail analysis!
3. Explain in detail that the occurrence of an action potential is an all or none event!
4. Venny is a 22 years old woman who is on an excessive diet until she feels weak. The examination results showed Hb 10 g/dl.
   a) Give your analysis of Venny's diet! If you agree, why? or if you don't agree, what should you do?
   b) What is the actual condition of Venny's body with an Hb level of 10 g/dl? Describe in detail!
5. When you were playing outside in bright sunlight, then entered the house, your eyes suddenly became dark for a moment. The Madurese term is *Kapettengan*.
   a) Have you ever experienced this?
   b) Give a detailed explanation, why did this happen?
6. Read the following hadith!

كُلُّ عَمَلِ ابْنِ آدَمَ لَهُ إِلاَّ الصِّيَامَ. فَإِنَّهُ لِي وَأَنَا أَجْزِي بِهِ

"All the deeds of the children of Adam - namely humans - are for Him, except for fasting, because indeed fasting is for Me and I will reward you with it"

The hadith above indicates that fasting is an act of worship that has a special position before Allah SWT. Apart from that, many studies have revealed that fasting has benefits for the body, including for people with Diabetes Mellitus (DM). Analyse in detail the relationship between fasting and sugar levels in Diabetes Mellitus (DM) patients!

Figure 2. Example of Discussion Material in Human Anatomy and Physiology

3.4 Evaluation and Solutions for the Integration of Islamic Values

Evaluation of the implementation of the integration of science and Islamic values at UIM is because UIM students, the majority of whom are from Islamic boarding schools, have received more Islamic knowledge than science, so they feel that religious knowledge is the main thing and puts science aside. Based on the results of interviews, it was found that the challenge for lecturers in implementing integration was due to the need for sufficient time to connect scientific knowledge with Islamic values. Another finding was due to scientific knowledge continuing to develop so rapidly that sometimes the interpretation of Al-Qur'an verses had not yet provided progress. Here's an example from HJA:

> *Integrating verses in the Qur'an with the latest scientific research, examples prove "the tensile strength (strain) of spider webs is stronger than steel of the same grade" is proved by using*

Hooke's law. The challenge is that solid state research (solid/compressed matter) is developing very rapidly, sometimes the interpretation of the verses of the Qur'an has not given its 'development'.

The solution hoped by lecturers to facilitate the integration of science and Islamic values at UIM is for UIM leaders to develop guidelines regarding the concept of scientific integration of the five towers of science. Furthermore, comprehensive socialization and technical guidance is needed for all lecturers in order to create learning that lays the concept of the five towers of knowledge as the foundation of science at UIM. Based on the explanation above, it provides an illustration of the importance of integrating science with Islamic values. One of them is to minimize the conflict between the two, for example regarding the theory of evolution. This material has many misconceptions that make it appear contrary to Islamic values. In fact, if discussed further, the two support each other. The research results reported that initially, the students explained that the theory of evolution was contrary to Islamic values, but they were unable to explain in detail how the two were related. However, after the learning was carried out, students experienced an increase in acceptance of the theory of evolution, or it could be said that the level of misconceptions about the theory of evolution decreased. This showed that in the learning process, students had gained the correct concept. Increasing enrollment was followed by increasing student learning outcomes (Antika, Ibana, 2018).

Apart from that, the implications of the dichotomy in education need to be evaluated, especially in Islamic education. Previous research has explained that the implications of this dichotomy are the ambivalence of Islamic education orientation, the gap between the Islamic education system and Islamic teachings, and the disintegration of the Islamic education system (Sappe, 2020). Whereas, Islam's view of science is very open. Islam is a religion that encourages its followers to give all their abilities to use their minds to think about what exists in the universe (Putri, 2019).

Integration of science and Islamic values is needed in the Islamic education system. Education is directed at exploring and developing knowledge optimally, and being able to process the achievement of education that develops completely both physically and spiritually. Everything related to science is actually also explained in Qur'an (Zhulfarani et al., 2022). However, it should be noted that the integration of Islamic values with science requires basic knowledge to achieve a paradigm meaning. This is closely related to the preparation of an integrated curriculum. Creating an integrative curriculum from science and religion is impossible if the academic community does not understand the basic material (Nasir, 2020). There is a need for a new scientific paradigm that can make Islamic higher education a centre for scientific development that can still be controlled. This is where the integration of science and Islam gains momentum. The issue of integrating science and Islam can at least be re-perceived by society in general and not underestimate the existence of Islamic higher education institutions today (Gumiandari & Hasanah, 2019).

4. CONCLUSION

This study meticulously explored the unique integration of scientific knowledge with Islamic values at the Universitas Islam Madura (UIM), uncovering a distinctive approach encapsulated within a framework dubbed the "five towers of knowledge." These encompass Islamic, Indonesian, Islamic Boarding School, Kemaduraan, and Aswajaan principles. The formal underpinning of this integration strategy is documented within UIM's Statute and the Chancellor's guidelines for curriculum development. An analysis of lecturers' course plans and teaching materials reveals concrete evidence of this integration's implementation, albeit limited to 53.3% of faculty members, primarily through associating scientific concepts with Quranic verses. Challenges faced by lecturers, notably the substantial time investment required to develop teaching materials that effectively weave together scientific and Islamic values, highlight the intricacies of implementing such an integrated curriculum. In response, lecturers have proposed the creation of comprehensive guidelines for the "five towers" integration and advocated for extensive training to facilitate this pedagogical approach among their peers. Given the preliminary nature of this investigation, further research is recommended to assess

the impact of this integrative educational model on student learning outcomes at UIM. This future inquiry could provide invaluable insights into the efficacy of blending scientific instruction with religious education, potentially offering a replicable model for similar institutions aiming to harmonize secular and spiritual learning paradigms.

Acknowledgments: The author would like to thank Direktorat Riset, Teknologi, dan Pengabdian kepada Masyarakat (DRTPM) Direktorat Jenderal Pendidikan Tinggi, Riset, dan Teknologi (DIKTI) Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi who have funded this research, as well as to the Higher Education Service Institute Region VII East Java and the Institute for Research and Community Service, Madura Islamic University who has facilitated the implementation of research with contract number: 183/E5/PG.02.00.PL/2023, 041/SP2H/PT/LL7/2023, 069/UIM/Mono/VI/2023.

Conflicts of Interest: We, Agus Budiyono, Abd. Haris, Linda Tri Antika, and Arin Wildani, the author of the paper entitled "Implementation of the Concept of Integration of Science and Islamic Values at Madura Islamic University" states that this manuscript is an original scientific work, and the manuscript has not been published in another journal or submitted (transferred) to another journal for publication. Manuscripts are submitted only to "Al-Ishlah: Jurnal Pendidikan". It will not be submitted elsewhere for publication until accepted/rejected by Al-Ishlah. We also declare that this paper is our entire contribution and original and has not been copied from elsewhere.

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