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Reviving Critical Thinking and Sense of Ethics and Humanity through “Exploring Human Enhancement Technology”

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ABSTRACT

Background: Ethical challenges in primary care practices are inevitable, especially with the current development and application of advanced technology which shifted the practice of medicine. Medical education institutions have no choice except to prepare and equip future doctors with a moral and ethical capacity to deal with this challenge. The “Human Enhancement Technology” (HET) module was developed and delivered in an attempt to address this need. **Objective:** Our study aimed to explore the HET module’s effectivity and acceptance from students’ perspectives. **Method:** We conducted a qualitative study on students’ online commentaries posted daily throughout the course. We performed content analysis to explore three main issues: (1) opinions on the module design (contents and methods); (2) reflections on overall learning experiences; and (3) applicability of the knowledge and skills. We analyzed students’ grade to confirm learning objectives achievements and effectivity of the module. **Result:** A total of 78 medical students self-enrolled into this elective module and wrote daily online commentaries. Students described the HET module as unique and extraordinary because it taught attractive yet rare topics with engaging learning methods, unlike the standard medical subjects. The learning experience in HET module was life-changing and transforming students’ opinions and attitudes. Students acquired three essential lessons from HET module, in the form of hands-on experience in critical thinking and analysis, as well as sensitization to ethics and humanity issues. The module provided knowledge and skills applicable in medical practice, also necessary for students’ preparation in entering clinical settings. Students were inspired to use the knowledge and skills gained from this module to be better doctors, deliver comprehensive patient care, and contribute more to humanity. **Conclusion:** The HET module was delivered effectively and well accepted by the students. Most importantly, the course had successfully engaged students in various personalized form and influenced students’ positive transformation regarding personal, academic, and professional commitments. The module showed potentials for further development and implementation as part of the mandatory medical curriculum.

Keywords: bioethics, human enhancement technology, primary care ethics, medical education, medical humanities

INTRODUCTION

Primary care practice is invariably laden with ethical challenges, such as social health inequities which often become critical determinant factors in patients’ health outcome. The moral imperative of medical professions, especially primary care physicians, ought to extend beyond just addressing patients’ clinical problems, as they as they were the gatekeeper with the closest encounter to witness patients’ complex bio-psycho-social dimensions. Medical students as future primary care physicians must be prepared as early on with awareness and adequate capacity to deal with this context in their practice^{1,2}.

The current development and application of advanced medical science and technology pose another challenge, as it shifted medical practices, including primary care,

towards a more digitized approach. Telemedicine, for example, removed the distance barrier through virtual doctor-patient interaction. Artificial Intelligence (AI) integrated into diagnostic tools provided doctors with possible/prediction of diagnosis and therapy algorithm³. The tendency of less human-physical encounter in medical practice is inevitable. Hence must be dealt with much wisdom to prevent undermining the human value and maintain humanity, which is essentially the medical profession’s moral duty^{4,5,6}. It has become an imperative to equip doctors with capacity and competence to deliver ethical and humane medical practice, starting as early in undergraduate medical education/pre-clinical year^{6,7,8,9}. Hence, the importance of bioethics and medical humanities to become an integral part of medical education^{7,8,9,10}.

In the Indonesia Physician Standard of Competencies (SKDI), both bioethics and medical humanities are core subjects which foster the 1st area of competencies, i.e., Noble Professionalism¹¹. However, until today, bioethics and medical humanities were struggling to find their format in the existing medical education^{7,12}. Some medical schools choose to deliver both subjects as a standalone module. The Faculty of Medicine, Public Health and Nursing, Universitas Gadjah Mada (FMPHN UGM), decide to construct bioethics and humanities as a longitudinal subject, integrated into the medical blocks. Unfortunately, ensuring the effectivity of this integrated approach remains highly challenging^{10,12}. Despite the formal enforcement of bioethics education through Indonesian Medical Education Act 2013¹³, without a good delivery strategy bioethics and humanity education will continue as supplementary subjects and may never be an integral part of the medical curriculum^{8,9,10,12}.

In this context, we attempted to formulate an effective bioethics and medical humanities teaching that facilitates students' recollection of key concepts and principles in bioethics and medical humanities. We believed this is essential preparation for students' clinical encounter in the future. To serve this purpose, we developed an elective module on "Exploring the Human Enhancement Technology" (HET). This module focused on critical analysis of advanced technologies impacts on medical practices and the broader society. We believed the learning topics covered in this HET module could facilitate the development of several core competencies related to bioethics and humanities mentioned in SKDI. Those were (1) character and attitude of the medical profession, (2) ethical decision-making skills, (3) comprehensive perspectives on society's socio-cultural-economic contexts, (4) tolerance and appreciation of diversity in delivering care for a pluralistic society, and (5) responsive to the dynamic challenge posed to medical profession¹¹.

Description of the HET Module

The HET module was offered as elective to all final (4th) year undergraduate medical students, in the last half of odd semester year 2015 and 2016 at FMPHN UGM. The formulated general learning objectives of the module were to equip students with basic understanding and awareness on important issues surrounding Human Enhancement Technology (HET), and also to facilitate the development of necessary skills to deal with problems and dilemmas raised by HET advancement. The module was designed to contain two sub-module to be completed in 3 weeks, worth a total of 3 credits of study. The first submodule (Contextual Exploration) focused on providing students with context and data related to enhancement technology, which was expected to stimulate curiosity and critical thinking. The second submodule (Analytical Discourse) focused on the key concepts and theories which construct the analytical framework to approach HET from bioethics and humanities perspectives. It expected students to develop skills in choosing a justified position and recommend an ethical/morally acceptable solution. The learning strategies used in the HET course took several forms, with the two most

emphasized and essential activities were the interactive expert lectures and a group project. The interactive lectures were designed as tandem sessions of expert lectures and facilitated discussions. The project-based learning assigned students in a small group to perform a critical analysis of a specific enhancement technology issues of their choice. Results of the critical analysis project were submitted as a written group report and presented in a mini-seminar session, which made up as group assessment components. Students' attendance record, engagement in discussions, an essay from independent learning, and final examination scores, made up the individual assessment.

Through this study, we aimed to seek empirical understanding of the module's effectivity and acceptance from students' point of view, based on their learning experiences⁹. We believe that gaining insight into students' perspectives was critical and vital to assess the module's effectivity for bioethics education. Equally important was capturing students' acceptance of the HET module, including applicability and relevance for their future professional development. We expected this study to inform HET module improvements and bioethics and humanities education in general.

Table 1. HET module outline¹⁴

Module Title: Exploring Human Enhancement Technology	
Learning Objectives	
General Objectives:	
Students to have basic understanding and awareness on important issues surrounding Human Enhancement Technology (HET), also develop essential skills to deal with problems and dilemmas raised by HET advancement.	
Specific Objectives:	
<ol style="list-style-type: none"> 1. Students to be aware of the current advancement of technology and its impacts, or potential effects on humanities in various contexts 2. Students to have a basic understanding of HET, including definition, scope and boundaries, multiple forms of HET and how it works 3. Students to understand issues surrounding HET approached or analyzed from various perspectives 4. Students to be able to identify the fundamental questions and central arguments surrounding HET discourses or debates 5. Students to be able to position themselves in essential discussions related to HET phenomenon 6. Students to be able to build a logical and ethical argument to justify their standing 7. Students to exercise the conceptual arsenal gained into actual cases and practices 	
Module Design – Learning Contents and Methods	
Week 1: Sub-Module Contextual Exploration	Week 2: Sub-Module Analytical Discourse
Focus:	Focus:
<ul style="list-style-type: none"> • Basics and scope of discussion on HET • Current biotechnology development • Dynamic and impacts of technologies 	<ul style="list-style-type: none"> • Complex dimensions surrounding HET • Critical thinking and ethics • Conceptual arsenals for HET discourses • Balancing the scale
Lectures:	Lectures:
<ul style="list-style-type: none"> ○ Overview of module ○ What is Human Enhancement? ○ The making of humane professionals: critical thinking and ethical judgment skills ○ Culture of biotechnology development in human enhancement ○ The current advancement in reproductive science and technology ○ Cosmetic enhancement in medicine: anti-aging technology ○ Human enhancement in medicine: therapy vs. eugenics ○ Overview and advancement in Nanotechnology ○ Human Enhancement Technology: On Gender and Sexuality ○ HET and human identity: dehumanizing? 	<ul style="list-style-type: none"> ○ What drives the development of biotechnology for human enhancement? The economic and biopolitical dimensions ○ How HET affects ethics? ○ How health technology affect the community from the anthropological perspective ○ Health Technology Assessment on Human Enhancement Technology ○ New Drugs Development for Human Enhancement ○ The Politics of Pharmaceutical Research ○ The idiom of normalcy: what is normal and what is not? ○ The limits of HET: where the politics and ethics meet ○ The ethics of intervention: technology for the poor ○ Bioethics for balance: preserving humanities via transdisciplinary attitude ○ The utopic and dystopic projections of HET
Movies:	Reading Analysis:
<ul style="list-style-type: none"> ○ Cost of Beauty ○ How To Survive A Plague 	<ul style="list-style-type: none"> ○ Introduction to Vita (on suffering) ○ Pathologies of Power (Chapter 1: Structural Violence)
Group Work:	Group Work:
<ul style="list-style-type: none"> ○ Getting to know Human Enhancement Technology ○ How Have Technology Affected Human Life? ○ Initiation of HET project, choosing technology to be analyzed 	<ul style="list-style-type: none"> ○ Working on the project ○ Consultation and accompaniment by facilitators
Independent Learning:	Mini Seminar:
<ul style="list-style-type: none"> ○ Reading one scholarly article about HET, write critical thinking and personal reflection 	<ul style="list-style-type: none"> ○ All group presenting and discussing their group project results ○ Assigned role: discussants
Assessment of Learning	
Individual Assessment:	Group Assessment:
<ul style="list-style-type: none"> ○ Attendance and active participation in discussion ○ Essay from independent learning ○ Final examination 	<ul style="list-style-type: none"> ○ Presentation of the group project ○ The written report of the group project

RESEARCH METHODS

We conducted a qualitative study to explore students' perspectives, derived from their experience participating in the elective module. On the first day of the HET course, students were briefed to write at least one commentary every day throughout the HET course, describing their learning experiences that day. Students were encouraged to write an honest opinion, feedback, questions, or comments freely and comfortably in their language and expressions, as they would in their personal diary/journal. On the last day, we prompted students with specific questions about their overall reflection on learning experiences and plans to apply knowledge and skills acquired from the module. Students posted commentaries on the online learning platform, Gadjah Mada Medical School's Electronic Learning platform. This online platform was considered a semi-public domain, accessible to authorized students, faculty members, and administrators.

We performed content analysis to these textual data, to gain direct insights from students¹⁴. We began with extensive reading on all students' online posts, to identify essential meaning units. Subsequently, we coded these meaning units into main ideas/themes and categorized into more concise topic areas to meet the study aims¹⁵. We focused on three main issues to address the study objectives: (1) opinions on the module design (contents and methods); (2) reflections on overall learning experiences; and (3) applicability of the knowledge and skills. For this study, all student identification was removed from the postings and replaced with numerical codes to ensure the protection of students' confidentiality and privacy. This study contained no intervention nor risk to interfere with students' evaluation or study process, as all students had already graduated when we conducted the study. We combined data from our content analysis with students' final grade in HET module, to confirm students understanding and achievement of the module's learning objectives.

RESULTS

The elective module Exploring Human Enhancement Technology was delivered twice, in 2015 for students in Regular Class, and 2016 for students in International Class. A total of 78 students from both classes (2015 and 2016) had participated in this HET course through online self-enrollment mechanisms, with quota-basis provision, a maximum capacity of 40 students for each class. Majority of students entered this HET course due to circumstances because the other elective courses of their initial preference were out of capacity. One-third of total students intentionally joined the course due to genuine interests in medical technology, and lesser due to curiosity on the module's title. Most students posted daily online commentaries throughout the nine days of an intensive course, which accumulated to a total of approximately 650 (90%) out of the expected 702 commentaries. Some students skipped postings on certain days, but all students posted their last day commentaries which had specific prompting questions, unlike the other previous days. These final day postings were especially rich with information on students' insights and reflections upon the overall learning

experience. The earlier days' postings were informative of students' opinion on specific topics/learning sessions. Assessment of students' learning outcomes which composed of the group and individual scores, showed an overall high distinction academic achievement, with class average final grades of 85.7. The class average for final exam scores (73.4) indicated students' satisfying cognitive performance. The average score for group performance (82.5) indicated students' excellent progress in terms of the ability to choose a position in HET discourse and skills to build ethical justification.

Upon our exploration on students' online commentaries throughout the course, we identified four emerging themes which represented students' perspectives on the HET module, as outlined in the Table 3.

HET Module Design was Unique/Different

Students thought the HET course had a unique/exceptional design, different from the other medical blocks they have learned before. The module discussed attractive yet rare topics, with each sub-module induced different experiences for students. The first sub-module which covered various enhancement technology and their impacts were easily understood and caught student excitements. The second sub-module focused on bioethics as an analytical framework, was considered by students as much more complicated and difficult to understand, yet intellectually stimulating.

Students thought the learning methods design and delivery was engaging and stimulating. The expert lecture, in tandem with a moderated discussion session, broadened students' perspectives and made the course lively. The group project stimulated students' enthusiasm and self-directed learning as they worked on a project of their interest/preference. The mini-seminar session was also thought as enjoyable and especially stimulating students' eagerness for active participation and sharing perspectives/ideas. The reading analysis was considered as pleasant and facilitated students to engage with new/different perspectives, while the daily commentaries helped strengthen students' thinking process.

Students made a notable appreciation on the critical role of the teaching personnel involved in this module. A moderator played a vital role in guiding the discussion sessions that on a few occasions without moderator students noted the session was not as engaging nor effective as usual. Facilitators helped facilitate understanding of subjects by bridging the knowledge gap between students and experts/lecturers. The experts/lecturers demonstrated genuine respect and dedication, from which students learned to respect others and appreciate the learning process in this module.

The module had successfully provided save learning space, which encouraged students to express their opinions, concerns, and questions bravely in a discussion forum. At the same time, students felt a strong motivation to learn and participate actively throughout the module, which they have never experienced in the other medical

blocks before.

Life-Changing Learning Experiences in HET Module

Students reflected the overall learning experiences in HET module as life-changing. The course provided new perspectives which transformed many aspects of students' opinions and attitudes.

One of the most prominent transformations was about students becoming braver in expressing critical opinions, comprehensive in approaching matters, while still respectful and comfortable engaging with differences in discourses.

Students shifted attitudes into more reflective of their limitations and in-competencies and also committed to taking on the responsibility to improve their lacks and weaknesses.

Students developed a more in-depth understanding of medicine, particularly the professions' responsibility and moral duty beyond patient care that was service to broader society, including the vulnerable and underserved population.

Students used creative expressions to describe their learning journey and transformation into a more mature individual with gained wisdom from the HET course.

HET Module Revived Students Critical Thinking and Sense of Humanity and Ethics

Students pointed out the three essential lessons in HET module were about critical thinking, humanity, and ethical aspects of technology application in medicine. The module provided students with a seemingly rare opportunity for hands-on practice of critical thinking and analysis on the advanced technologies. By the end of the HET course, students were able to generate critical views and questions regarding the impacts of HET for society and humanity in general. Students also recognized the importance of understanding contextual factors in addressing issues surrounding HET, through multi-perspectives and trans-disciplinary approaches to support their critical analysis.

Regarding humanities, students thought the module provided a fundamental lesson on prioritizing humankind in the development and application of every technology, including humanizing doctors and medical practice in general. Specifically, students developed a better understanding of physicians' moral duty to provide humane medical practice, by respecting and providing genuine care for every patient, beyond just clinical intervention. The learning activities in HET module exposed students to critical issues in humanity discourses, such as the meaning of suffering, and also stimulated students' sensitivity to broader humanity conflicts relatable to local Indonesian socio-cultural context.

Students developed ethical thinking capacity as demonstrated in their ability to express a position and provide morally justified arguments in discourse related to HET. For example, a student in favor of balancing HET and humanity reasoned that consequence of any development

was inevitable and therefore needed regulations to ensure the benefit and minimize risks. Another student in support of HET development expressed compelling arguments citing trans-humanism perspectives.

HET Module Provided Applicable Knowledge and Skills

Students recognized that HET module taught knowledge and skills fundamental for medical practice. Therefore, such course ideally ought to be part of the mandatory medical curriculum, instead of elective. Students projected the acquired skills and knowledge to be useful in shaping their professional practice as a doctor, and critical for their preparation entering the clinical rotation phase. For example, implementing the logic of care to deliver comprehensive patient care through a bio-psycho-social approach and building interdisciplinary works with other health professional.

Students highlighted that knowledge and skills in bioethics were critical to address the injustice and inequality in medical practice. Such capacity serves the physician with the necessary foundation in decision making, which promoted humanity values.

Students also articulated that such knowledge and skills were useful to initiate their personal development in the future. For example, students aspired in partaking technology development and advocating a policy which supports the development of technology critical for patient care. Students expressed intentions to assume responsibility as agents of change for a healthier community through the ethical use of technology which preserves humanity. We also identified students' ideation to utilize knowledge and skills gained from this course to contribute to building a better nation and society through areas beyond health. As stated by one student who dreamed of endorsing high-quality education which fosters positive character developments in community and future generations.

Critiques and Suggestions for HET Module

Most critiques on the HET module were about the exhausting two weeks of the intensive course schedule. The pre-lecture reading materials were more than the other medical blocks students ever had so far. Thus, some students who failed to finish the pre-lecture reading were often overwhelmed in keeping up with the discussion in class. The philosophical subjects were difficult to digest, yet it stimulated critical thinking, especially when it contradicted with students' existing values. However, on the supposedly open-minded module design, some students pointed out that specific lectures were not as open-minded as they expected to be.

Most commonly raised suggestion was to have hands-on-practice with technology in the module design, such as practical session using PCR or visit the actual laboratory of advanced technology. Students were making remarks on how they suggested having more explicit bioethics framework for analysis, which provided a firmer foundation for students engaging in discussion. Other suggestions were strategies for interactive and engaging

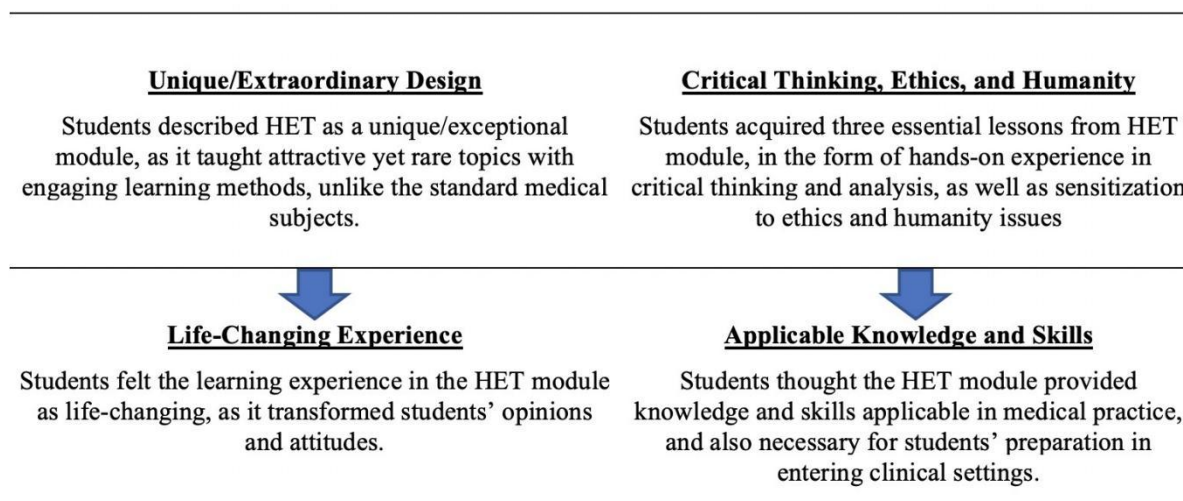
ethical discussion. Example of the proposed approach was ethical case simulation foster multi-perspective discussion to negotiate a justified decision making. Another student thought of specific group-based sitting arrangement in the HET class to enable better dialogue despite the tardy

students. One student wrote as far as suggesting a HET learning assessment model, by adopting a particular debate system (the Asian Parliamentary Debate system), instead of the written final examination and paper.

Table 2. Summary of characteristics data and profile of students participated in the module

No.	Characteristics Observed	Data and Profiles												
1.	Number of students participated in the elective course	<ul style="list-style-type: none"> • Class 2015: 38 students from the regular study program • Class 2016: 40 students from the international study program 												
2.	Gender ratio	<ul style="list-style-type: none"> • Males: 29 • Females: 51 												
3.	Online commentaries <ul style="list-style-type: none"> • Number of postings • Length of comments 	<ul style="list-style-type: none"> • Approximately 650 posts from a total of 702 expected posts (over 90% response rate). • All 78 students posted their last day commentaries. • Some students in both classes skipped posting commentaries on several days. • Class 2015 wrote longer comments than Class 2016 • In both classes, the last day comments were relatively longer than earlier days comments. 												
5.	Reasons to enroll	<ul style="list-style-type: none"> • By chance/circumstances: approximately more than half of students • By interests in technology: nearly one-third of students • By curiosity on the module: less than one-tenth of students 												
6.	Learning outcome assessments results <ul style="list-style-type: none"> • Group assessment scores (from the group project report and mini-seminar presentation) • Individual assessment scores (from the final written exam) • Final grades (from both group and individual scores combined with proportions) 	<table border="0"> <tr> <td>Class average (2015 and 2016) (on a scale 0-100)</td> <td>82.5</td> <td>Score reference</td> <td>High distinction</td> </tr> <tr> <td></td> <td>73.4</td> <td></td> <td>Distinction</td> </tr> <tr> <td></td> <td>85.7</td> <td></td> <td>High distinction</td> </tr> </table>	Class average (2015 and 2016) (on a scale 0-100)	82.5	Score reference	High distinction		73.4		Distinction		85.7		High distinction
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Table 3. Four emerging themes of students' perspectives on the HET module



DISCUSSION

Students' interests/expectations on the HET module were initially low, as indicated earlier in students' enrolment reasons. However, throughout the course, students built up their knowledge and skills and achieved satisfactory learning outcomes, as shown in their high distinction final grades. From our perspectives, we took this as an indicator of effective module design and delivery, which well-

facilitated students' achievements of the module's learning objectives.

From students' perspectives, the HET module brought a sense of novelty, as it took students to explore in breadth and depth, the impact of advanced technology application from humanity perspectives. We were a concern that this might indicated the lacking of medical humanities and ethics subjects in our standard medical curriculum. This

situation was a common problem in most medical schools, where medical humanities and ethics become secondary to clinical topics¹⁶. We took students' positive appreciation as a testament that the HET module could contribute, albeit not fully adequate, to fill in the gap of students' unmet need

for humanity and ethical discourses in medical school⁹.

The module had successfully provided brave learning space which fostered honest dialogues and meaningful discourses on issues surrounding advanced technology

Table 4. Sample of students' quotations about HET module

Emerging Themes	Meaningful Units	Quotes
Unique/exceptional design	Different from other medical blocks	<i>"This block is like taking us to different kind of world, let us roam and play around in that world and when we come back, we are asked about the experience we had. It's like field trip, only through our own imagination, where truthfully we are in the second floor library"</i>
	Attractive rare contents	<i>"I'm grateful for the chance to learn social sciences and ethics from various experts in this module, just in time with my upcoming clinical rotation phase. Because I think these subjects are expensive (rare) sciences."</i>
	Engaging and stimulating learning methods	<i>"(the design) deserved my two thumbs up, for every time we have the expert lecture and a specific allocation for question and answer session, this is actually what brings life to the course."</i>
	Critical role of teaching teams	<i>"The discussion was alive, thanks to the moderator, I could only imagine how disastrous it would've been without the presence of moderator."</i>
Life-changing experience	Brave space and learning spirit	<i>"I really like the safe environment and the principle of there is no right or wrong answer/opinion, and I think this is actual realization of respecting other people. This class succeeded in encouraging us to be brave in expressing questions or opinions."</i> <i>"I have never felt so much motivated and in high spirit coming to class for discussion, and I feel this huge spirit every day for the whole 2 weeks of this module"</i>
	Generally life-changing	<i>"Overall, going through the HET course was honestly life-changing experience for me, because my perspective was totally opened/renewed through the learning process in this module."</i>
	Engaging better with discourses/conflicts	<i>"I learned that It's okay to have different stance to others, we do not have to always follow others' opinions. And when we are dealing with pros and cons, which happens a lot, in almost every discussion, and is totally okay, we (just) have to use the same 'baseline'"</i>
	Introspective attitudes	<i>"the process taught me (who) was unconsciously incompetent, into becoming consciously incompetent"</i>
	Understand better physicians' moral duty	<i>"This course has opened my eyes about what happened outside and as a physician, our world is not only about medicine, our world is not only about diagnosis, therapy, prognosis, and so on. There are something bigger outside. There are so many things that can we do for our patient, for the poor people, for vulnerable population."</i>
	Creative/emotive expressions about personal transformation	<i>"As in the sequel for Lord of The Ring movie, this is now the return of the king ... (As if it was) after going through many fights and war of debates, Aragorn gained maturity. By the end of the journey, Aragorn returned to Gondor as a new person, one with maturity, wisdom and lesson learned throughout his travelled journey."</i>
Critical thinking, ethics and humanity	Critical thinking	<i>"It is only now (in this module) that we're really asked to think critically in approaching and assessing a technology."</i>
	Humanity	<i>"HET module was a process of humanizing doctors who had already exposed to technologies."</i>
	Ethical arguments	<i>"I also learned that any technologies can spark both advantages and disadvantages, which will always happen, ... Just because they may cause negative side effects in the society, doesn't mean we must turn down this development. This is where regulations and guidelines take role, that only those in need should be guaranteed to benefit these technologies, and the pro-enhancing people should also be limited to certain extend which would not cause de-humanization."</i>
Applicable knowledge and skills	Fundamental for medical practice	<i>"This is one of the most fundamental block that everyone should have, it is quite funny to be honest to have this block optional in the elective"</i>
	Address social justice problems	<i>"I think the knowledge I'll be able to use the most is about ethics ... so many things have to be considered and especially for injustice and inequity ..."</i>
	Aspire to create better society	<i>"I dream to improve the education quality in Indonesia, to make new generation of our nation have stronger character, positive thinking, critical yet open minded, not arrogant/not too fanatical nor ignorant of other (perspectives)"</i>
Critiques and suggestions	Exhausting schedule and heavy workload	<i>"It is definitely not easy to learn something totally new in just 9 days. The schedule was definitely jam-packed and that's something we haven't experienced in a while so it's understandable how lots ended up being exhausted also got sick including me."</i>
	Improvement ideas	<i>"I have some suggestion for this course. I think it would be better if there is clearer framework of bioethics and in this block. So, we can have firm stance in the discussion."</i>

application in medical practices. From the beginning of the course, we briefed students about the specific ground rules to make productive class discussion. We emphasized on encouraging students to bravely vocalize their opinions and engage in discourses while maintaining common courtesy and respects for differences. The team of teachers also led by example in conducting the respectful exchange of ideas on controversial/ sensitive issues. The keys for the successful creation of this brave space were exposing students to the concept of “controversy with civility” and “own your intentions” in the discussion sessions. We found such an approach was effective in drawing out authentic and meaningful interactions in our HET class^{17,18}. These features combined, the novelty of subjects, and intimate as well as the brave learning environment, induced students’ strong learning spirit every day, throughout the two intensive weeks of module delivery continuously, even beyond the classroom session.

The HET module approach had created a life-changing experience for students and induced personalized transformations. Students developed maturity in dealing with conflicts/ differences, awareness on a physician’s moral duty to be responsive to societal issues, and self-introspection on their limitations and weaknesses. These were fundamental modalities of well-rounded physicians as specified in the Indonesian Physicians’ Standard Competency (SKDI), particularly the noble professionalism and self-introspective areas¹¹. Additionally, these transformations seemed to be deeply personal for students, judging from the emotive and reflective expressions written in creative narratives on their last day commentaries. We took this as an indicator that students well internalized the learning processes in this module.

The three key lessons students acquired from this module, critical thinking skills, as well as sensitization to ethics and humanities, were generated from two specific learning activities assigned in the module. The group project played a critical role in providing students with real experience in examining a particular technology through ethics and humanity frameworks. Such learning strategy has proven to be effective in nurturing students’ higher-order thinking, i.e., critical, analytical, and ethical reasoning. This activity also facilitated students to develop their skills in critically appraising an issue. The project-based learning approach provided students with the opportunity to explore their curiosities and pursue their interests in an exciting learning process. This eventually motivated students to do and achieve more than expected¹⁹. On the other hand, reading analysis was proven to provide powerful stimulations for students’ sense of ethics and humanity. The reading analysis allowed students to see things from different perspectives, thus enrich knowledge and develop sensitivity to issues that exist in society. It also took students into reflective process regarding their personal biases and values, hence facilitated maturity and wisdom in dealing with problems. The reading also provided a refreshing break from the routine tensions of clinical topics, which students highly appreciated²⁰.

The knowledge and skills acquired from this module

were highly versatile and applicable in medical practice, especially for student preparation entering the clinical rotation. The HET module had equipped students with sensitivity and commitments to take on the responsibility in addressing social health inequities. These were the essential competencies required to deliver humane and ethical primary care practices². Students showed strong concerns and intentions to contribute to tackling the injustice and inequity problems in society. Such were good predictors for future primary care physicians working together with the community to improve health care systems which promote social equity and justice in health¹.

On another note, students’ critiques and suggestions for the module were unexpectedly detailed and creative, in addressing some technical issues occurred during the module delivery. We took these as another indicator of students’ genuine concern towards the module’s improvement, as well as expressions of interests to learn bioethics through the HET module. Several students’ expected to have exact answers/prescribed solution for every ethical issue discussed. Such expectation indicated students’ superficial understanding of bioethics learning goals, which anticipated the growth of logical and ethical consideration to justify an action or decisions. However, an explicit bioethics framework, perhaps in the written algorithm of ethical consideration, might be helpful for students’ understanding and facilitate more effective bioethics learning²¹.

Limitations of the Study

This paper focused on exploring students’ opinion on the module, generated specifically from student commentaries on their daily and overall learning experience. Interpretation of students’ written expression relied on the authors’ understanding of the module context and deliveries. Students participating in this HET course had quite a specific background, final year undergraduate medical students with prior knowledge on the theoretical framework of medical practice, and perhaps a little bit of bioethics and humanities throughout the length of the study program. Students with different characteristics might perceive this module differently; thus, more specific adaptation and evaluation were necessary.

CONCLUSION

The study provided insights on how students perceived the HET module. Students appreciated the module as unique and extraordinary, as it facilitates safe and brave learning environment, which eventually promoted a highly motivational learning atmosphere. The current issues discussed in the module attracted students’ interests and at the same time relevant for students’ preparation dealing with medical practices’ future challenge. Learning methods incorporated in this module, especially tandem expert lectures and project-based-learning, were thought to be effective in facilitating students’ knowledge growth and skills development in terms of bioethics competency. Students’ reflected their overall learning experiences in HET module as enjoyable, intellectually stimulating, life-changing, and personally engaging, which they

rarely encountered previously. Upon the completion of the HET module, students' acquired essential knowledge on issues surrounding advanced technology development and application. Students also developed skills to perform critical analysis, build ethical arguments, and suggest a morally acceptable solution. Beyond the formulated learning objectives achievements, this module had induced students' transformation in terms of character development and a paradigm shift towards a more humanized individual and medical professional. These contributed to nurturing students' growth in 2 areas of competencies mandated to bioethics education, namely noble professionalism, and reflective/self-evaluation. Several technical aspects of the HET module delivery needed improvement to foster robust and useful course, i.e., scheduling and workload. The HET module concept and design have all the potentials to be proposed as a mandatory course and become an integral part of the primary medical curriculum. We believed this would fill the gap of bioethics and humanity education and lay the foundation for compelling, engaging, and continuous bioethics education.

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Ethical Approval and Informed Consent

Studies/evaluations of routine education programs of this kind are categorized as very minimal risks, so it does not always require ethical clearance. In the manuscript, we also write efforts to maintain the privacy and confidentiality of student identity.

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Availability of Data and Material

Data and material can be accessed via corresponding author.

Conflict of Interest

None.

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