

Humanistic training for dental students and professionals: a forgotten dimension

Marcelo Marcucci¹

 [0000-0002-8525-8291](https://orcid.org/0000-0002-8525-8291)

Dante Marcelo Claramonte Gallian¹

 [0000-0002-9979-6787](https://orcid.org/0000-0002-9979-6787)

¹Universidade Federal de São Paulo (Unifesp), Centro de História e Filosofia das Ciências da Saúde (CeHFi), São Paulo, São Paulo, Brasil.

Correspondence:

Marcelo Marcucci

E-mail: marcucci21@gmail.com

Received: Feb 18, 2022

Approved: Jan 19, 2023

Last revision: May 04, 2023

Abstract Humanities include knowledge about arts, literature, and human sciences focused on the area of health, which emerged as a counterpoint to excessive health technologization of health. The assumption is to help health professionals develop beyond technical knowledge, supported by human sciences and humanities, in interacting with the patient in all dimensions: spiritual, ethical, psychic, cultural, and social. This literature review reflects on the importance of the Humanities for the performance of dental surgeons, highlighting some paths for its development. The article search strategy was A convenience sample from three databases (LILACS, PubMed, and SciELO) and excerpts from books on the subject from 1995 to 2021 was adopted as the article search strategy. The discussion on the Humanities is more advanced in the medical field, with initiatives in undergraduate curricula and space in some scientific journals. In dentistry, the topic is still little discussed in educational institutions and continuing professional education. In Brazil, some groups such as the Center of Health Sciences History and Philosophy (CeHFi) of the Federal University of São Paulo (Unifesp), are developing pioneering work with health students involving the reflective reading of classic literature. No records of similar initiatives were found specifically in the dental area. More studies in the context of dentistry are needed to increase knowledge on the subject.

Descriptors: Dentistry. Humanities. Humanization of Assistance. Education, Dental.

Formación humanística para estudiantes y profesionales de odontología: una dimensión olvidada

Resumen Las Humanidades conforman un conjunto de saberes sobre artes, literatura y ciencias humanas centrado en el área de la salud, que surgió como contrapunto a la excesiva tecnologización de la salud. Su premisa es ayudar a los profesionales de la salud a desarrollar conocimientos más allá de los conocimientos técnicos, apoyados en las ciencias humanas y humanidades, y que permitan interactuar con el paciente en todas sus dimensiones: espiritual, ética, psíquica, cultural y social. El objetivo de esta revisión bibliográfica fue traer una reflexión sobre la importancia de las Humanidades para la actuación del cirujano dentista, señalando algunos caminos para su desarrollo. La estrategia de búsqueda de artículos fue la selección de una muestra por conveniencia de tres bases de datos (LILACS, PubMed y SciELO), además de extractos de libros sobre el tema, de 1995 a 2021. Se observó que la discusión sobre las Humanidades está más avanzada en el campo de la Medicina, con iniciativas en los planes de estudio de pregrado y con espacio propio en algunas revistas científicas. En Odontología, el tema aún es poco discutido en las instituciones educativas y en la formación continua de los profesionales. En Brasil, algunos grupos, como el Centro de Historia y Filosofía de las Ciencias de la Salud (CeHFi), de la Universidad Federal de São Paulo (Unifesp), desarrollan un trabajo pionero con académicos de la salud que implica la lectura reflexiva de obras clásicas de la literatura. Específicamente en el área odontológica no se encontraron registros de iniciativas similares. Se necesitan más estudios en el escenario odontológico para un mayor conocimiento del tema.

Descriptorios: Odontología. Humanidades. Humanización de la Atención. Educación en Odontología.



<https://creativecommons.org/licenses/by-nc/4.0/deed.en>

A formação humanística para estudantes e profissionais da Odontologia: uma dimensão esquecida

Resumo As Humanidades compõem um agrupamento de conhecimentos sobre artes, literatura e ciências humanas voltadas para a área da saúde, que surgiram como contraponto à excessiva tecnologização da saúde. Seu pressuposto é auxiliar o profissional da saúde a desenvolver conhecimentos além dos saberes técnicos, suportados nas ciências humanas e humanidades, e que permitam interagir com o paciente em todas as suas dimensões: espirituais, éticas, psíquicas, culturais e sociais. O objetivo desta revisão de literatura foi trazer uma reflexão sobre a importância das Humanidades para a atuação do cirurgião-dentista apontando alguns caminhos para seu desenvolvimento. A estratégia de busca de artigos foi a seleção de uma amostra de conveniência proveniente de três bases de dados (LILACS, PubMed e SciELO), além de excertos de livros sobre o tema, no período de 1995 à 2021. Observou-se que a discussão sobre as Humanidades está mais avançada na área médica, com iniciativas nos currículos de graduação e espaço próprio em alguns periódicos científicos. Na Odontologia, o tema ainda é pouco discutido nas instituições de ensino e na formação continuada dos profissionais. No Brasil, alguns grupos, como o Centro de História e Filosofia das Ciências da Saúde (CeHFi), da Universidade Federal de São Paulo (Unifesp), desenvolvem um trabalho pioneiro com acadêmicos de saúde envolvendo a leitura reflexiva de obras clássicas da literatura. Especificamente na área odontológica, não foram encontrados registros de iniciativas similares. Mais estudos no cenário odontológico são necessários para maior conhecimento do assunto.

Descritores: Odontologia. Ciências Humanas. Humanização da Assistência. Educação em Odontologia.

INTRODUCTION

Health care is strongly based on the Cartesian model, in which soul and body are distinct and the latter is fragmented into smaller systems that interconnect to form a large biological machine. Supported exclusively by natural science laws, the biomechanical model of health favors the use of technical resources, leaving aspects that shape the development of the individual, such as their uniqueness, subjectivity, beliefs, and worldview¹.

The Flexner report, which laid the foundations of modern technical-scientific philosophy in professional medical training², recommended knowledge fragmentation and suggested technical training to the detriment of humanistic characteristics, with hospital-centeredness, biologism, early specialization, and clinical act technification as references. At the beginning of the 20th century, thinkers already pointed to society being captured by the so-called instrumental reason. As exponents of this line of thought, Adorno and Horkheimer (1985)³ claimed that scientific language and instrumental reason alone cannot capture all the dimensions of reality, all of us being victims of a kind of cognitive violence.

The accelerated development of science in the modern era has led to the scientific-technological apparatus becoming increasingly sophisticated and complex, contributing even more to an overvalued objectification of the subject, that is, the patient seen as a product, consumer of protocols to reestablish their organic functions. Although this model brought undeniable progress in disease control and collective longevity in general, there is a feeling between professionals and patients that is a symptom of the pathology of dehumanization; the former, impotent and indifferent, the latter, frustrated and disillusioned with the inability of the apparatus to deliver everything promised¹.

Husserl states that there are no elements to doubt the results of the scientific method, but that owing to his own notion of the world that guides his investigations, he distanced himself from existential questions dear to human beings, in which the world is taken as a mere set of "facts" subject to verification and experimentation, according to the criteria of the current method for each scientific field. Although it investigates the totality of realities, natural science does not deal with the question of the personal life; even the most subtle theory of natural science accounts for the world of life, simply because the thematic direction of the natural scientist's thought toward the reality of life follows a theoretical path⁴.

As a counterpoint, the development of the Humanities emerged as a way to develop critical and reflective capacities to understand human beings integrally, integrating their subjectivity, that is, beyond the natural and human sciences⁵.

Given this context, through a literature review on the concept of Humanities in health, this study reflects on the current state of health professional training and possible applications in dentistry.

LITERATURE REVIEW

Articles were searched in the Latin American and Caribbean Literature on Health Sciences (LILACS), International Literature on Health Sciences (PubMed), and Scientific Electronic Library Online (SciELO) databases. The search included the following Health Sciences descriptors (DeCS): Humanities, Humanization in health, Medical Education, and Dental Education. The search period was 1995–2021. The included articles were in Portuguese, Spanish, and English. Books on the subject were also included as a complement. The most relevant articles and texts (convenience sample) were selected to support the reflections developed in this study.

What are the Humanities?

The Humanities are a set of strategies and subjective experiences, based on cognitive aspects or not, which converge knowledge on health practice⁵. They constitute a field of knowledge in which elements of the social sciences and applied humanities (Philosophy, Anthropology, History), the Arts in their most varied expressions (visual, musical, literature), religious beliefs, and other subjective dimensions of the human being are brought together with the objective of reflecting the health vs. disease phenomenon as a multidimensional human experience, not just a biological one^{6,7}.

Structurally, the Humanities are focused on human relations within the scope of intersubjectivity, mainly on improving patient-professional relationships (PPR) and ethical-relational competence⁶. Ultimately, it provides health professionals tools to improve their *praxis*. As the central event of the clinical act, the PPR should not only consider the patient's organic issue, but rather encompass their subjective dimension, respecting their values, beliefs, and autonomies. Improving this reasoning, the PPR should not put the patient on the Procrustean bed (the metaphor of an ethical principle: forcing reality to adapt to one's moral imperatives, not caring about the suffering of the other), but move toward a hermeneutic conception in which the professional and the sick subject are in an exchange relationship.

An important distinction between the Humanities and the human and social sciences in health is based on the fact that the latter are focused on the scope of the health processes-disease interrelation and their social determinants in populations, often incorporated into the broad area of Collective Health⁵. On the other hand, the Humanities examine the issue, which, focused on personal professional development⁸, seeks to expand the "sphere of being," working on the individuality. This basically happens owing to the aesthetic experience that provides a learning experience about life and the world that no technical and scientific knowledge can offer, developing a "prismatic look" at the reality of the other, since this reality is as diffuse and complex as the human being^{1,9}.

Additionally, the Humanities seek to antagonize technicality as a modern pathology, which is directly reflected in the PPR, in which sophisticated tests and procedures reinforce the idea of infallibility, leading to anxiety and suffering for both the professional and patient subjects¹. In the extreme, the fantasy of the denial of finitude is mutually created.

Development strategies

The perception that the growing medicalization of health is associated with the process of dehumanization led to the development of strategies to value the different subjects involved in the health production process: professionals and users. In 2003, the creation of the National Brazilian Humanization Policy (Humaniza SUS)¹⁰, strengthened humanization initiatives, but with greater focus on collective management and care models. In turn, the Humanities are focused on developing relational skills, supported by a set of knowledge about human life and its subjective phenomena. Its conceptual outline is diffuse¹¹, and there is no theoretical limit on the use of instruments to achieve this goal. This set of knowledge is essentially transdisciplinary. Although it can use well-established knowledge such as bioethics, deontology, and psychology, the main goal of the Humanities is to develop an aesthetic subjective experience (from the Greek, "*aisthētiké*," *capable of provoking sensations*), *that is, capable of conciliating reflections based on the senses*¹¹. It is not just about knowing historical facts or contemplating the cultural trajectory of humans, but about going through it reflecting different viewpoints on the same human problem. Unlike the social disciplines, in the Humanities, the figure of the professor is essential owing to variations occurring in the awakening of the student's sensitivity¹².

This context brings the experience of culture through Literature and Arts. Both are instruments that trigger transformations in the subject who looks at them, opening a silent dialogue between the two subjects, the artist and the observer. Regarding the written word, Calvino (1993)¹³ states that Literature is free from the constraints and expectations of scientific disciplines, and is not subject to the protection of objectivity, like the sciences. It has the potential to rediscover the human being in themselves, from the singular to the universal, triggering reflections on existence and on the human condition. Writing is free, without being tied to logical reasoning, and the writer is not afraid of being misunderstood, they just express a state of mind¹⁴. Thus, literature stands as a source of understanding of the human vicissitudes in the most diverse existential scenarios, offering health professionals elements to humanize the PPR throughout their professional life. Books by Tolstoy, Chekhov, and Machado de Assis, for example, are true dives into the human soul and sources of reflection for health professionals when they address inevitable human existence issues, such as illness in all its dimensions, and death.

As a working tool for health professionals, literature can support a new model of empathetic listening to patients, based on life narratives without necessarily being directly related to the disease, and using it as a therapeutic resource. According to Charon⁷, literature helps with powerful and concrete lessons about the life of the sick human being, improving the understanding of how the disease affects the patient's life history. In this context, successful experiences in training health professionals in narrative listening and humanistic training have been developed, such as the Humanities Laboratory (LabHum) of the Center for History and Philosophy of Health Sciences (CeHFi) of the Federal University of São Paulo (UNIFESP)¹⁵, founded in 2003. The created methodology is developed through a "reading cycle," which has three distinct and consecutive moments: 1) Reading stories, 2) Discussion itinerary, and 3) Coexistence stories. At first, an affective relationship is established with the book to identify which feelings were awakened in the reader; in the discussion itinerary, the readers exercise rational mobilization and intellectual reflections. As an outcome, the final product of the reading cycle adds value to each person's personal life¹⁴⁻¹⁶.

Studies on neuroscience¹⁷ demonstrate that empathy can be taught through training. Identification with the other, as observed in fiction books, can be transposed through empathy in the perception of the other during the actual clinical act. The same authors highlight that this demands space within the school curriculum¹⁷.

The Humanities in Dentistry

In the modern era, dentistry emerges as an area of specialized and autonomous knowledge in relation to other areas of health. It has a well-established scope of action and its own therapeutic resources, not being indifferent to the technicality of the biomedical model. Thus, patients are often seen as "cases of oral disease" rather than as people with health problems²⁰.

Initially, experiences in teaching the Humanities were focused on medical education, which have shown promising preliminary results, despite the variable methods, inclusion in the curriculum, and assessed population^{6, 8, 18, 19}. Humanities teaching is still lacking in dental education²². In dentistry, students are classically exposed to the traditional technical teaching methods, both in laboratories and in the clinic. In this model, the professor guides and supervises the maneuvers performed by the student, but fails to deal with the complex realities and ambiguities that arise in the clinical scenario. The "hidden curriculum" emerges from clinical practice, in which the professional is called upon to make decisions, make judgments, and develop a communication scenario with the patient²³. Students need to be prepared to look beyond the symptom, they must be educated to listen, see, and understand their dental patient in all dimensions²⁰. A strategy to reverse this situation would be to incorporate the Humanities into the curricular teaching. However, to achieve this goal, some obstacles need to be overcome.

The teaching of Humanities in Dentistry and its effects on professional training presents problems similar to those of medical teaching; they are sparse experiences, mostly on an extracurricular basis, although it has been reported in many countries, mainly western ones. The initial challenge of inserting humanistic content is to identify who would be the qualified professional to teach it. In this regard, the topic is confused with the diffuse limits of the Humanities⁶. Some studies discuss whether the topic should be approached by a clinician in the area, but with a greater humanistic repertoire, or whether to start with a transversal approach with professors trained in human sciences, literature, and arts^{18,23}.

According to the Commission on Dental Accreditation²¹ for dental education, a humanistic environment must be created to instill respect, tolerance, and understanding. Teaching Humanities at undergraduate level leads to a reflective experience that can change behaviors; pilot research proposed reflections for dental students based on visual arts, dramaturgy²³, and literature²⁵. The general perception was that the complexity of caring for others presupposes being aware of their values, thoughts, and feelings. On the other hand, humanistic guidelines propose to develop an affective perspective in the professional, that is, concern for the dignity of the person and appreciation of compassion and empathy, resulting in the full interaction between human dimensions, which, within a clinical environment, favors shared decision-making²⁶. This perspective should be applied to dentistry, since the mouth and adjacent structure are targets of numerous diseases, often disabling. From another perspective, dentistry deals with people who feel fear, anxiety, and pain. It is worth remembering the symbolic position of the oral cavity in the psychic structure of the child, and how the mouth can become, in adults, the target organ of unconsciously repressed affections²⁷.

As in the medical educational environment, there is a consensus that the lack of clarity in the delineation of the field of action, non-homogeneous objectives, variable methodology, and lack of prepared professors are factors that hinder the measurement of the results of this insertion in clinical practice^{18,19}. Lack of standardization criteria, the way it is taught, its position in the curriculum, and the time spent in the area do not provide a panoramic view of effective results in the long term, that is, how much humanistic training affects the professional-patient relationship. Ousager¹⁹ justifies this fact by stating that the results of humanistic teaching cannot be measured by the conventional tools used in medical education. From a dental viewpoint, Marti *et al.* (2019)²⁰ noted that an increased number of future dentists need to be educated in the Humanities so that several open questions can be answered.

Another strategy for the incorporation of the Humanities would be the creation of a space in scientific dental journals dedicated to humanistic topics in specific sections aimed at trained professionals. From the perspective of a continuing education process, a space periodically providing material for reflection can help dentists broaden their field of vision as professionals. Vergnes *et al.* (2015)²⁴ reviewed 83 journals indexed in the field of dentistry and found no specific sections for this purpose, while some prestigious journals in the medical field already have a specific space for the Humanities, such as the Annals of Internal Medicine, the New England Journal of Medicine, and others. Thus, duly informed professionals are expected to undergo a continuous self-transformation process, developing more people skills, and not just technical skills. Most sick people want someone to listen to them, they want to be accepted without judgment, and have their feelings and anxieties valued²⁸.

From a dimension forgotten by dentistry, the insertion of the Humanities proposes a new paradigm in the approach to patients, in which the multidimensional exchange between two people circumstantially in the roles of professional and patient improves the most important event in the health area, the PPR.

FINAL CONSIDERATIONS

The Humanities constitute a field in which several types of human knowledge converge, improving ethical-relational competence in health. The use of literature as a strategy for this purpose has been gaining ground in the development of the field. The incorporation of Humanities teaching in the curricular matrix of undergraduate dental students and the creation of spaces in professional updating strategies can help counterbalance the profession's mostly technical focus. This incorporation is emerging in dental training worldwide and is still insufficient in Brazilian dentistry. Developed by the LabHum, projects such as the "reading cycle" could be replicated in dental academic environments. Specific spaces in dentistry journals can bring greater visibility to the topic. From this perspective, the development of new national experiences in dentistry is necessary to expand knowledge on the subject.

REFERENCES

1. Gallian D, Ponde LF, Ruiz R. Humanização, humanismos e humanidades; problematizando conceitos e práticas no contexto da saúde no Brasil. Rev Int Human Med [Internet]. 2012;1(1):41-52. doi: <https://doi.org/10.37467/gka-revmedica.v1.1293>
2. Lambert DR, Lurie SJ, Lyness JM, Ward DS. Standardizing and personalizing science in medical education. Acad Med [Internet]. 2010;85(2):356-362. doi: <https://doi.org/10.1097/acm.0b013e3181c87f73>

3. Adorno TW, Horkheimer M. *Dialética do Esclarecimento*. 1 th. Zahar; 1985.
4. Dood J. *Crisis and reflection: an essay on Edmund Husserl's Crisis of the European sciences*. Dordrecht: Kluwer; 2005.
5. Rios IC. Humanidades médicas como campo de conhecimento em medicina. *Rev Bras Educ Med* [Internet]. 2016;40(1):21-29. doi: <https://doi.org/10.1590/1981-52712015v40n1e01032015>
6. Rios IC. Humanidades e medicina: razão e sensibilidade na formação médica. *Ciênc Saúde Colet* [Internet]. 2010;15(supl.1):1725-1732. doi: <https://doi.org/10.1590/S1413-81232010000700084>
7. Charon R, Banks JT, Connely JE, Hawkins AH, Hunter KM, Jones AH, et al. Literature and medicine: contributions to clinical practice. *Ann Intern Med* [Internet]. 1995;122(8):599-606. doi: <https://doi.org/10.7326/0003-4819-122-8-199504150-00008>
8. Alvarez-Diaz JA. Importancia de la literatura dentro de las humanidades médicas. *Gac Méd Méx* [Internet]. 2010;146(1):71-75.
9. Coelho T. A cultura como experiência. In: Ribeiro, RJ, editor. *Humanidades: um novo curso na USP*. São Paulo: Editora USP; 2001.
10. Ministério da Saúde, Secretaria Executiva, Núcleo Técnico da Política Nacional de Humanização. *Humaniza SUS: Política Nacional de Humanização: a humanização como eixo norteador das práticas de atenção e gestão em todas as instâncias do SUS*. Brasília: Ministério da Saúde 2004 [cited 2022 Jan 17]. Available from: https://bvsm.s.saude.gov.br/bvs/publicacoes/humanizasus_2004.pdf
11. Gallian DMC. Literatura e formação humanística em medicina: o experimento do Laboratório de Humanidades da EPM/UNIFESP. *Rev Med* [Internet]. 2012 [cited 2020 Apr 10]; 91 (3):174-177. Available from: <https://www.revistas.usp.br/revistadc/article/view/58979/61965>
12. Berenguer AD, Turnes A, Aguilar B, Sanguinetti M, Martinotti P. Humanidades médicas em la Facultad de Medicina - UdelaR. *Arch Med Int* [Internet]. 2016 [cited 2022 Jan 17];37(1):24-29. Available from: http://www.scielo.edu.uy/scielo.php?script=sci_arttext&pid=S1688-423X2015000100005
13. Calvino I. *Por que ler os clássicos*. São Paulo: Companhia das Letras; 1993.
14. Sakamoto JI, Gallian DMC. Laboratório de humanidades: percurso estético literário como dinâmica humanizadora à saúde. *Via Atl* [Internet]. 2016;29:157-171. doi: <https://doi.org/10.11606/va.v0i29.107965>
15. Nacaguma S, Gallian D, Ruiz R. Literatura e humanização na universidade: uma proposta de formação. *Reeduc* [Internet]. 2021;15:e4413. doi: <https://doi.org/10.14244/198271994413>
16. Lima CC, Guzman SM, Benedetto MAC, Gallian DMC. Humanidades e humanização em saúde: a literatura como elemento humanizador para graduandos da área da saúde. *Interface* [Internet]. 2014;18(48):139-150. doi: <https://doi.org/10.1590/1807-57622013.0708>
17. Shalev D, McCann R. Can the medical humanities make trainees more compassionate? A neurobehavioral perspective. *Acad Psychiatry* [Internet]. 2020;44(5):606-610. doi: <https://doi.org/10.1007/s40596-020-01180-6>
18. Shapiro J, Coulehan J, Wear D, Montello M. Medical humanities and their discontents: definitions, critiques and implications. *Acad Med* [Internet]. 2009;84(2):192-198. doi: <https://doi.org/10.1097/acm.0b013e3181938bca>
19. Ousager J, Johannessen H. Humanities in undergraduate medical education: a literature review. *Acad Med* [Internet]. 2010;85(6):988-993. doi: <https://doi.org/10.1097/acm.0b013e3181dd226b>
20. Marti KC, Mylonas AI, MacEachern M, Gruppen L. Humanities in predoctoral dental education: a scoping review. *J Dent Educ* [Internet]. 2019;83(10):1174-1196. doi: <https://doi.org/10.21815/jde.019.126>
21. Commission on Dental Accreditation. *Accreditation standards for dental education programs*. 2018 [cited 2022 Jan 17]. Available from: <https://coda.ada.org/en/current-accreditation-standards>
22. Holden A. Incorporating humanities in dental education is essential, but seldom routine. *J Evid Base Dent Pract* [Internet]. 2020;20(2):e101442. doi: <https://doi.org/10.1016/j.jebdp.2020.101442>
23. Zahra FS, Dunton K. Learning to look from different perspectives – what can dental undergraduates learn from na arts and humanities-based teaching approach? *B Dent J* [Internet]. 2017;222:147-150. doi: <https://doi.org/10.1038/sj.bdj.2017.109>
24. Vergnes JN, Apelian N, Bedos C. What about narrative dentistry? *JADA* [Internet]. 2015;146(6):398-401. doi: <https://doi.org/10.1016/j.adaj.2015.01.020>
25. Mani SD, Chen NLP, Menon V, Babar MG. Stories and perspective taking: augmenting dental students understanding of patient care. *Med Teach* [Internet]. 2021;43(sup1):s18-s24. doi: <https://doi.org/10.1080/0142159x.2019.1666206>
26. Castro AI. La receptividad hacia la integración de las artes liberales en el currículo de la Escuela de Medicina de la Universidad de Puerto Rico. *P R Health Sci J* [Internet]. 1993;2(1):63-71. doi: <https://doi.org/10.3145/epi.2017.may.18>

27. Freud S. Três ensaios sobre a teoria da sexualidade. 1905. In: Freud S. Edição standard brasileira das obras psicológicas completas de Sigmund Freud. 7 th. Rio de Janeiro: Imago; 1980. doi: <https://doi.org/10.1590/s1415-47142011000300012>
28. McLeod ME. Doctor-patient relationship: perspectives, needs and communication. Am J Gastroent [Internet]. 1998;93(5):676-680. doi: https://doi.org/10.1111/j.1572-0241.1998.676_a.x

Conflict of Interest: The authors declare no conflict of interest.

Funding: No funding to declare

Authors' contribution: Study conception and planning: MM, DMCG. Data collection, analysis, and interpretation: MM, DMCG. Manuscript preparation or revision: MM, DMCG. Final version approval: MM, DMCG. Public responsibility for the article's content: MM.