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Articles

Incoming medical students and their perception on the transition towards an active learning

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Problem-Based Learning (PBL) is an active learning modality widely adopted in medical courses. The objective of this study was to analyze the perception of the enrolled medical students troughout the transition from the traditional teaching given in High School to the PBL. This is an exploratory and qualitative study carried out in three higher education institutions. Data were obtained through focus groups, followed by content analysis. Three common thematic nuclei emerged from these lines. Students perceive the weakness of traditional teaching and its implications in their learning process. The students' view of PBL is positive but contradictory reflecting on the one hand, the anguish of a paradigmatic transition, but on the other hand it alerts to the possibility of misunderstandings in the conduction of PBL.

Keywords: Problem based learning. Teaching. Medical education.

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Introduction

Problem Based Learning (PBL), is an active learning methodology that was introduced in Brazil, initially in curricula of medical courses, in the late 1990s[1]. The number of institutions that have adopted PBL is increasing indicating their importance in the teaching-learning process. It has been the subject of intense discussions raising new proposals, especially for its potential to stimulate a critical and reflexive stance in the interaction between subject and object[2]. The new National Curriculum Guidelines (DCN) for medical courses expressly refers to the use of active learning methodologies with explicit reference to PBL[3]. However, the adoption of an active methodology implies breaking with a teaching paradigm, to assume a proposal in which the act of teaching gives way to the act of learning[4,5].

The incoming students of the Medicine courses may find it difficult to adapt to the new teaching model, either by breaking with traditional methodology, or by immaturity, inherent to their age[6]. They will be required to be builders of their own knowledge, monitoring their learning; in addition to applying knowledge in solving new situations, obtaining and organizing data, developing and confirming hypotheses, making decisions and working in groups. It will also be necessary to overcome the changes in the dynamics of the classroom, ranging from the spatial organization to the absence of the traditional teacher. In addition, they must face the challenges related to the degree of exposure that the active methodology demands, which may constitute obstacles to be transposed[7]. Notwithstanding these considerations, the process of transition from traditional teaching to PBL has not been discussed enough[8]. No studies have been identified that address the transition process, according to the perception of students who enter the medical course and who experience this paradigmatic change.

Reflections on the transition undergone by undergraduate students using the PBL can assist students and institutions in coping with challenges and difficulties in this process. This research aimed to analyze the students' perception of the Medicine course in relation to the transition from traditional teaching taught in High School to Problem Based Learning (PBL), adopted in Higher Education.

Methodology

This is an exploratory qualitative study carried out in three medical schools in the north of Minas Gerais. The three institutions use PBL in their courses. They were selected for the academic study of the first period of the course. This choice was based on the fact that, upon entering this course, students abruptly moved from a trajectory of education based on a traditional teaching methodology to an active learning methodology. Thus, in the first period, the students, faced with the methodological breakdown, suffer the impacts of this new learning model.

The group that participated in the study was composed of 32 students. The subjects were selected considering the inclusion criteria (being a student of the first semester of Medicine) and of exclusion (to have another previous degree or to be repeating the first semester or a part of it, or to have experienced experiences of active learning methodologies prior to admission in higher education).

The strategy for data collection was that of Focus Group (FG). Students and tutor-teachers of the first semester of each institution were informed about the research, and the students were invited in the classroom. Based on their consent, three focal groups were established, one for each institution, and the participants were given the place, day and time of each group meeting. For each focus group meeting, which lasted approximately 75 minutes, there was a moderator, the principal investigator of this study that is a teacher of higher education with experience in pedagogy and scientific methodology, and an observer, a guest teacher, who was in charge of capturing the verbal and non-verbal behaviors expressed by the participants, to record the topics to be deepened in the sessions of the next groups and to operate the recording equipment of the speeches, that had no link with the students. The management of the FG was based on a road map containing comprehensive topics that served as a guide to conduct group work, keeping focus on the objectives of the research and ensuring the clarification and deepening of specific points. The meetings took place after the students had experienced the first two tutorial modules of the academic semester (approximately two-thirds of the semester).

In a second moment, the lines were transcribed in their entirety and checked by attentive listening of the material recorded in each focus group, aiming to guarantee the fidelity of the record of opinions and the elimination of errors. This allowed for greater approximation with the content and generation of new ideas about the data.

The speeches were submitted to content analysis, using analogical grouping due to common elements and semantically[9]. Initially, codification, i.e. categorization, was carried out. It is a process of reducing the text to words and significant expressions[10]. These categories were inductively generated by the researchers separately from the speeches, in a process of searching for expressions or meaningful words that allowed the organization of their content. Subsequently, the categories were confronted, seeking a consensus.

The subjects included in the study agreed to participate in the study voluntarily, signing a Term of Free and Informed Consent (TCLE). All ethical aspects were respected, according to resolution 466/2012 of the National Health Council, and the research project was approved by the Research Ethics Committee of one of the educational institutions (Opinion no. 1.002.500/2015).

Results and discussion

Table 1 presents the main characteristics of the institutions and students participating in the study.

There were no major differences between the main characteristics of educational institutions, regarding the use of PBL or between focus group participants.

Data analysis allowed the identification of three categories with two subcategories in each of them, which will be presented below. Excerpts from the interviews that illustrate the abstracted meanings were quoted *ipsis litteris*, with a random alphanumeric coding, for each group. In the speeches of the subjects participating in the study, the term PBL (acronym in English) is used to refer to the term adopted by researchers in this research.

Table 1. Characterization of Higher Education Institutions (IES) and focus group participants

Characteristics	School A	School B	School C
About the IES			
Legal classification	Private	Private	Public
PBL Time	10 years	12 years	16 years
Number of incoming students	50 per semester	50 per semester	40 per semester
Use of PBL	1st to 6th periods	1st to 7th periods	1st to 7th periods
Other active methodologies	Yes	No	Yes
PBL References	McMaster and Maastrich	McMaster and Maastrich	McMaster and Maastrich
About the Participants			
Focus Group	Group 1 (n=12)	Group 2 (n=11)	Group 3 (n=9)
Gender			
Male	4	5	4
Female	8	6	5
Age (average)	19.2 years old	19.3 years old	20.4 years old

Recognizing the characteristics of the traditional method

This category encompasses students' perceptions of the traditional teaching they have experienced until their entry into Higher Education. Although there is no pedagogical current known as "Traditional", the expression has been used since the emergence of the New School, to refer to the pedagogical ideas that preceded the renewal movement, as a way of justifying the need for change and highlighting a opposed to the hitherto predominant proposals[11]. In this context, the traditional method comprises a tendency of education in which theory prevails over practice, with emphasis on teaching theories, characterized by classical classes in a ceremonial, rigid and disciplined space. Teaching under these circumstances has a strong influence of Newtonian-Cartesian thinking[5,12].

The teacher as the center of the teaching-learning process

In middle school, based on the traditional teaching model, the teacher is recognized as the central figure in the teaching-learning process and the main way of access to knowledge, according to the following reports:

> Back in high school, you have a teacher to teach you everything. You learn from them. (G2)

According to the participants, the effort expended by the student in the teaching - learning process was minimal, as it was the teacher 's responsibility to explain the contents in a way that was easily understood.

> We would only go through and make more effort to understand the content [...]. And, for me it was much more comfortable, because I had the material there, everything was done, everything was explained. (G3)

It was observed, from the students' statements, the perception that the teacher led the teaching-learning process through a directive action, making visible the objects to be known and elucidating the doubts. Students' speeches approach the characterization of traditional teaching in which the teacher is seen as the holder of legitimate knowledge, and the student is merely a spectator and/or receiver of that knowledge, a passive, obedient and naive being[5].

From the teacher's perspective as the center of the process, content is presented to students as ready and finished. The student is a receptive being. It is necessary to assimilate and memorize the transmitted knowledge, being seen as a deposit of information. The methodology emphasizes the expository class, and teaching does not necessarily harbor learning[7].

Weakness of the traditional method

When reflecting on the teaching-learning process of High School and already experiencing a new methodology, students observe weakness of traditional teaching. They state that knowledge is restricted to what the teacher conveyed, as shown below: "[...] we do not seek knowledge. The teacher gives knowledge that he already has to us, and we will get that knowledge from him, but it is a limited knowledge, and we will not seek other sources" (G2).

The expressions show the perception of the group under a negative bias in relation to traditional teaching, and also corroborate the idea of the teacher as the one who owns the knowledge and who "donates" his knowledge. Freire had previously stated this limitation, recommending that the teacher should create possibilities for the production of knowledge and not just transmit it[13].

The reproduction of information according to external demands to the detriment of comprehension, the fragmentation of contents and the study limited to what the teacher considers more essential is pointed out as a fragility of the traditional method. The interviewees reveal that the monopoly of knowledge and its transmission by the teacher is an obstacle to the development of the critical sense.

> It has the critical sense issue as well. When you are very attached to the teachers, you have moments where they greatly influence you with their ideology, their conviction, without having that critical sense, which is an analysis that you do with a knowledge that you already have. (G2)

The observations of the group are congruent with the work of Spricigo et al., who point out that the teaching marked by the transmission of knowledge inhibits the development of the critical sense of the student, in that it does not favor skills that promote learning to think[14].

The perceptions recorded are similar to the conclusions of a study that, comparing traditional teaching with PBL, showed that in the former there was no improvement in critical thinking and problem solving ability; unlike the other group, whose improvement was significant[15].

The students registered the perception of comfort provided by the traditional method, also pointing out the intellectual dependence on the teacher:

> Often this type of methodology is even easier, because the teacher gives you what you need to know. You do not have to seek, you do not have to search, so it's much more comfortable. But also you will not learn for your life. So sometimes if you need something, you will get very dependent. (G2)

In fact, there is a high degree of intellectual dependence of the student in relation to the teacher, in traditional teaching. The convenience revealed by students can be understood as a result of the mechanical process of learning, which leads to paralysis of thinking and becomes an obstacle to autonomous learning[16]. This intellectual dependence can lead the student to have difficulties in finding solutions to new situations that do not involve the reproduction of assimilated knowledge.

Participants also report that during the lesson there is a feeling that knowledge has been built as a result, however, in having to apply knowledge in a new context, it is evident that having them in memory is not enough to solve the problem in question.

> The fact that you are accommodated there and you do not have the whole subject in the traditional method does not cause deep doubt in you. The doubts you have are superficial. You are only satisfied there at that moment, but when you are going to test the knowledge that you have built in the traditional method, you see that it is not effective. (G1)

Traditional teaching, according to Berbel is a process in which the information transmitted by the teacher is memorized by the students with the purpose of reproducing the knowledge already accumulated historically, placing them as mere spectators[17].

The research subjects point out as another negative point, the absence of the exchange of ideas between those involved in the teaching-learning process: "[...]because in the traditional, as the students are in a very individual environment, missing the social issue. They are just there, sitting in a chair, listening to what the teacher says, not having to participate" (G2).

The weaknesses pointed out by students have support in literature, as highlighted, but they are amplified as they are pointed out by actors who are experiencing the transition and experiencing PBL.

Realizing a new learning methodology

This category includes the first perceptions of students about the PBL methodology that they begin to experience when they begin higher education, including the recognition of the new educational proposal and its educational advances and simultaneously identifying new demands.

Proposal and educational progress in PBL

The reports show the perception that in PBL knowledge is richer because it uses varied sources and provides the different socialized ideas in the tutorial session.

> [...] in PBL we have a more collective knowledge, acquiring this capacity of relationship, of contact with other professionals, other opinions that will favor for this discussion tutorial. (G2)

This perception reaffirms the idea that, in an active learning environment, the teacher acts as a guide to the learning process, not as a single source of information, allowing students to bring knowledge from different sources[17,18]. In addition, students seek deeper solutions to problems as they are driven by curiosity and autonomous action[19].

Interviewees reveal that learning in PBL is more consistent than in the traditional method, because it enables the student to seek and interpret the information:

> In the method we use now [PBL], the interpretation is direct from the source and not the interpretation of an interpretation that was made, so I think learning becomes more solid. (G1)

Student perception is consistent with other studies. In a survey in India, the authors, when comparing PBL with traditional methods, observed that most students stated that PBL helped to create interest in learning, provided a better understanding of the subject, and promoted self-directed study[19]. Another study comparing PBL and traditional curriculum reported that students in PBL had higher scores on tests of knowledge and skills than those from the traditional curriculum[20].

A new role for the student

The interviewees recognize that the student in the PBL must take an active stance in the construction of knowledge, since the intellectual autonomy will be required of them in the exercise of the profession.

> We have to be much more active. We have to leave whatever will be on the selection test, having instead something that you will use in your day to day, that will require responsibility from you later. (G2)

In PBL, teaching focuses on the production of knowledge by the students, requiring active participation[5]. This implies favoring situations that prioritize meaningful learning, characterized by the interaction between the previous knowledge of the learner subject and the new knowledge. In the interaction, this knowledge is established in the cognitive structure of the learners, in a hierarchical and more complex way, allowing them to assign meanings to the new knowledge. Thus, it is easier to recover and apply the knowledge constructed when the student needs to use it throughout his life in different contexts.

Students also recognize that they can learn from each other, highlighting group work. This aspect, for some, highlights the development of new skills, which can also be an obstacle to be overcome, according to this report: "[...]the issue of the group was that I had the most difficulty, because I have never been very good with group work. I've always been able to study better alone and now that's changing. In tutoring you have to learn to speak [...]" (G1).

The difficulties of working in a group were also pointed out in the student statements in another study, which highlights the distress experienced by the insertion in the tutorial dynamics, despite the valorization of group work[21]. For Silva et al., it is in the tutorial group that the students, experiencing the difference, exercise critical thinking and argumentation; the knowledge built is shared and multiplied. In addition, group work facilitates the development of communication and relationship skills, constituting a privileged space for learning to listen to others and dealing with criticism[22].

Experiencing the paradigm break

This category covers the negative perceptions and anxieties experienced by students in the transition from traditional teaching to PBL, including the perception of challenges and strategies to overcome difficulties.

Identifying challenges

The new teaching model has presented significant challenges for students, who must become autonomous constructors of knowledge. The focus groups highlighted the distress of the pedagogical transition, when they began to assume the more active posture, as reported below: "We really are not used to this autonomy, throw everything in your hand and talk like this, look, turn and tell me what you read" (G3).

The students' speeches reflect the difficulty of assuming the role reserved to them in this new paradigm. The autonomy in learning is a competence that develops, and the teacher can favor it if it stimulates the students more active posture[16]. However, while emphasizing that the presence of the teacher is essential, the students point out weaknesses in the tutorial process. An analysis of the effectiveness of the tutorial section highlighted aspects that presuppose an important role for the tutor in the PBL methodology: requesting, giving and receiving explanations, assisting in the integration and application of knowledge[23]. A good tutor should maintain the flow of the discussion by asking questions and stimulating critical thinking and helping to promote the development of autonomy.

In a study that approached the construction of autonomy in the pedagogical context of the PBL, the interviewees agreed that it is necessary to develop autonomy to build knowledge, and that the student is the most responsible for this search[21]. However, it is an essential condition for autonomy to be developed so that the teacher creates and manages complex situations that allow the subject's mental activity on the object of knowledge[16].

Students report that time management of study is another major challenge: "[...] I feel that tutoring takes more time, because I have to reach out and expose my knowl-

edge, which is not a negative thing, but that is a fact, I have to do this and I have to study a lot for it, so it demands more time" (G1).

In the context of PBL, the process by which students select materials from the various sources, as well as the systematization of the knowledge to be discussed, will demand efficient time management. According to Barell, time is a limiting factor for the use of PBL, since the construction of knowledge does not happen quickly as in traditional methods[24].

The inexperience in seeking sources other than the teacher for the construction of knowledge generates a feeling of being without direction, adrift. This leads to the need to outline a method of study that is effective, which is also an obstacle: "And, because everybody is using different literature, you often get lost. I spend so much time organizing myself to study. When I had a notebook, I would go through my notebook and go through the books. I was comparing and doing another summary [...]" (G2).

The speech shows another counterpoint to traditional teaching, in which limited access to information generated a sense of security and control of knowledge to be grasped. The absence of autonomy to administer learning may also be influencing the presence of these feelings, inasmuch as autonomy is a key principle in PBL[25]. It presupposes the development of the self-regulation capacity of knowledge[16].

Another difficulty to overcome is to delimit the content to be studied and to identify what is relevant to different sources as well as the amount of content.

> I think my greatest difficulty is the matter of what to study. How do I separate what is really important? Each module, each source you take, one deepens, the other is superficial. But what is the middle ground there that you have to reach? (G3)

The intellectual dependence of the teacher seems to compromise students' ability to think. It is imperative for the tutor to invest effectively in the exercise of thinking during tutorial sessions, helping the student to gradually develop their autonomy in relation to the direction and meaning of learning. Adaptation to the method may lead to changes in behavior, especially with regard to the daily study habit[21].

Learning to learn and the search for learning strategies have also revealed themselves as challenges, as perceived in this account: "[...] as it was easier for me to learn from the teacher, when I got here I said: I'm going to have to learn everything by myself now. It was very complicated for me. Then I had to create other ways of learning [...]" (G1).

Learning to learn seems essential for adaptation to the new method. Knowing and learning study techniques can favor adaptation to the new teaching approach. It is important to emphasize, however, that the ability to "learn to learn" is developed increasingly throughout the course[21].

Students complain that they do not have a specialist tutor to answer their questions, to confirm that the information presented in the session is correct and relevant.

> [...] Sometimes it even happened: we get books, and books sometimes have mistakes and then we sometimes miss the tutor, and knowing how to clarify, because he is not a specialist [...] (G2)

In another study, according to the perception of graduates, specialists in the specific subjects of Medicine[8] should develop the role of the tutors. Some authors emphasize that the competence of the tutors, their experience with methodology, commitment and responsibility with the learning process facilitate the tutorial process, but emphasize that students consider it necessary for the tutors to have knowledge of the contents[26]. Schmidt et al. reinforce that students oriented by specialists in the area under study achieve better results; and mentoring skills and content knowledge seem to be necessary and closely related conditions for effective mentoring[27].

For the interviewees in the present study, the tutorial session with a tutor that does not induce reflection and does not discuss the application of knowledge does not allow the development of intellectual autonomy, insofar as knowledge is only being reproduced.

> [...] some tutors do not speak. [...] they do not say anything, they actually only let the students talk. The students speak the same memorized text. Did you really learn that content? [...] Is there anyone to explain? There isn't [...] (G2)

The passive posture of the tutor generates anxiety in the students and does not contribute to feel integrated with the new method. The role of the tutor can directly influence the development of the group. Guiding and providing feedback without leaving the group adrift can reduce anxiety, increase confidence and self-esteem, improve task performance, and promote reflective learning[28].

On the other hand, the need for teachers who reduce the smaller terms the reality to be studied, simplifying the knowledge in a way to make it easier to understand, shows the difficulty that students have to move away from the traditional paradigm to assume the posture of builder of own knowledge. The need for a teacher to give lectures may be related to students' intellectual heteronomy and the difficulty of breaking with the teaching model they have experienced previously.

For Anastasiou[7], the existing teaching action cannot be overlooked in the process of "teaching", which encompasses both the action of teaching and the action of learning, resulting from the partnership between student and teacher. However, teachers must incorporate in their planning other actions that overcome the transmission of knowledge as the only way to teach and the reproduction of knowledge by the student as the only way to learn.

The perceptions recorded indicate that the PBL proposal may be compromised, since in the tutorial sessions, students only reproduce the memorized information. In PBL, the knowledge acquired by the student should enable the exercise of critical thinking during the tutorial session[29]. This reveals the importance of the tutor conducting the tutorial session in a way that is consistent with the methodological proposal, ensuring student involvement in the discussion, stimulating the exercise of thinking and avoiding the fact that they only verbalize what was memorized.

It is observed in the following testimony that the students feel helpless by the tutor and the institution, when they experience the change from the traditional paradigm to the PBL.

> There is no transition. They simply take you out of the traditional and throw you into the method, into the PBL, there is no such adaptation, they do not prepare you, they do not adapt you to that change, you know? [...] (G3)

Institutional resources and a faculty trained and familiar with the method are essential to the success of this educational approach[30]. At this point, it is pertinent to emphasize that the role of the teacher in PBL is not limited to the conduction of the tutorial group. It includes other more comprehensive functions, such as giving support for the student to learn as well as being their mentor[31]. It is reasonable to infer that the adoption of strategies aimed at adapting students to the new methodological approach and the creation of a tutor support center can positively influence this transition, reducing the aforementioned abandonment sensation.

It is needed to develop a program to train teachers and students to identify themselves and become familiar with the new pedagogical model. This aspect is fundamental and can correct any problems in the work with the PBL methodology.

Seeking to overcome difficulties

Participants report that they seek to overcome challenges in isolation:

> I think it was not the institution that helped with the adaptation, because [...] we were worried, we were in shock, we tried to improve. (G3)

> [...] so it ends up that we have to fend for ourselves, make an individual adaptation. (G2)

It turns out that students seek to overcome the challenges alone, insofar as the use of learning resources used in the traditional model is not enough to meet the new requirements. The lack of institutional support recognized by students is relevant, especially since the expected support can be provided by relatively simple measures.

Self-knowledge was pointed out as an important aspect to overcome the challenges faced.

> [...] because it is a question of time, you will make a summary, and the summary takes a long time. So I think that's a bit of self-knowledge, which is best for you. [...] everyone is in this process of knowledge, which is better to do, because it has not yet given us time to get acquainted. (G3)

Self-knowledge can be a fundamental aspect of this methodology, as this can improve the self-regulation capacity of the learning itself. The ability to self-guide depends, in addition to other factors, on the self-regulation potential of the learning context: information, activities, materials and guidelines for its application, development and evaluation[16].

The students reveal that the collaborative study contributes to the challenge of knowing how to define the content to be studied, as well as to understand the task to be performed.

> [...] The very experience itself. In the matter of talking to your colleague. Do you think this is important? Are you going to study this? Especially in the course of tutoring [...] are you going to study this part or not? [...] (G3)

In principle, working in small groups facilitates the complementarity of ideas among peers, discussion of doubts and collaboration in solving complex problems, as well as stimulating the sharing and listening of opinions. It values peer-to-peer exchanges, providing creative problem-solving processes, leading to a qualitatively superior end product than the one that is produced individually[23]. In addition, decision-making tends to be more thoughtful and balanced whenever discussed in a team.

To overcome the difficulty in finding an efficient study methodology, knowing the successful experiences of colleagues, according to the participants, was important.

> [...] saw some colleagues of mine who were succeeding. Then I realized that this way, I recorded knowledge better if I make summaries and read those summaries later as well. It applies to the matter of books too. Many of my colleagues use different books. Some even advised me to use certain authors and I found it quite beneficial. (G2)

In addition, the students show that colleagues also contribute to solving the doubts.

> [...] our class is very united [...] most of us always want to clear each other's doubts, something that somebody understandood. (G2)

Having someone to heal the doubts was a relevant aspect for the interviewees. At times, as clarified by Tomaz [31], the facilitator may and should make information available, without however de-characterizing the PBL methodology, whose basic principle is the construction of knowledge by the student.

Another resource that students use to overcome challenges is the help of senior students.

> [...] or even searching with our seniors who are already accustomed to the method, what to do, or some specific author to the matter [...] (G2)

The experience of those who have gone through the process works as a guide to face challenges. It is noticed that the support of another person to signal what to do and how to do it, is a highly valued resource by the students. This may be related to the need for teacher directive action that they still have.

Final considerations

The results showed that the transition from traditional teaching to PBL teaching is a challenging moment for students, as well as one of great importance for the involve-

ment with the learning process. Adapting to the new teaching model brings insecurity, instability, discomfort, distress, frustration and suffering. It also requires changing attitudes, which must be supported. However, simple measures that can be adopted by the institutions to assist this adaptation do not seem to be implemented. It is important to note that none of the schools had, up to the time of the present study, integration or adaptation activities of students to new methodologies.

This reinforces the need to think about spaces for discussion and critical reflection, involving institutions, teachers and students, aiming at a favorable adaptation process, mainly because the PBL methodology requires active students, that are autonomous intellectually and capable of self-directing their learning.

The study suggests the need for support, guidance and follow-up services to the students in order to mitigate the impact of the new method. It is also recommended to implement a student support group that assists and fosters the development of learning resources, helping to alleviate the difficulties experienced in PBL education. It should be emphasized that these services should be widely disseminated by the institution and that teachers should encourage students to use them.

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Authors' contributions

All authors participated actively in the conception and elaboration of the project, of the discussion and analysis of the results and of the revision and approval of the final version of the work.

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