

Pedagogical Workshop as a Learning Tool in Meliponiculture

Eduardo Antonio Ferreira¹; Marcus Vinicius Sandoval Paixão², André Vital Ferreira³, Adriano Soares Koshiyama⁴, Maria Cristina Affonso Lorenzon⁵

Abstract— This research aimed to evaluate the efficiency of the pedagogical workshop as a tool for teaching the creation of stingless bees. The research was carried out at IFES, Campus Santa Teresa, with the participation of seventeen students from the technical course in agriculture, ten farmers and two technicians from the municipality's agriculture department. During the workshop, basic notions on stingless beekeeping were introduced in two components: ecology and breeding technology. The pedagogical workshop was conducted with the division of participants into three groups and was presented in seven blocks. In each block, three subjects were presented simultaneously, lasting between 15 and 20 minutes. For data collection, we used student participation, student-teacher interaction, content approach, evaluation of results before and after field research, and to evaluate the overall performance of the workshop, we worked with IDAPI, index performance on bee knowledge. We conclude that this pedagogical presentation, allows to give an organization different from the traditional one, privileging a methodology that favors the learning in a natural and ecologically conscious way.

Keywords— *Stingless Bees; Teaching; Pedagogy; Rural Sector.*

Resumo— Nesta pesquisa objetivou-se avaliar a eficiência da oficina pedagógica como ferramenta para o ensino da criação de abelhas sem ferrão. A pesquisa foi realizada no IFES, Campus Santa Teresa, com participação de dezessete alunos do curso técnico em agropecuária, dez agricultores e dois técnicos da secretaria de agricultura do município. Durante a oficina introduziram-se noções básicas sobre a criação de abelhas sem ferrão em dois componentes: ecologia e tecnologia de criação. A oficina pedagógica conduziu-se com a divisão dos participantes em três grupos e foi apresentada em sete blocos. Em cada bloco, apresentaram-se três assuntos simultaneamente com duração entre 15 a 20 minutos. Para coleta de dados, utilizou-se da participação do aluno, interação aluno-professor, abordagem do conteúdo, avaliação dos resultados antes e após a pesquisa de campo, e para avaliação do rendimento geral da oficina, trabalhou-se com o IDAPI, índice de desempenho sobre conhecimentos da abelha. Concluímos que esta apresentação pedagógica, permite dar uma organização diferente do tradicional, privilegiando uma metodologia que favoreça a aprendizagem de forma natural e ecologicamente consciente.

Palavras chave— *Abelhas sem ferrão, Ensino, Pedagogia, Setor rural.*

I. INTRODUCTION

Understanding teaching and learning as an interactive process of knowledge development: those who teach offer knowledge that must be open to the transformations and creations promoted by those who learn. As Freire (2002) states when speaking clearly about the object, "it is to incite the student so that he, with the materials I offer, produces the understanding of the object, instead of receiving it, in full, from me".

Thus, assuming learning as a creation resulting from the active participation of the student, it ends as a concept that values the activity of the learner, stimulating

their freedom, their potential and their previous structures of thought.

Learning is closely linked to the education given at school, respecting their family condition and social level reached. Freire (2002) said that the school should teach students to "read the world". This is only possible respecting the cultural and family origin of the students, giving them the opportunity to participate in the teaching-learning process, where they can identify in the contents worked a relationship with the world in which they are inserted.

For Zacharias (2002), education must evolve beyond the boundaries of space and time, quoting:

The student does his schooling period to give rise to a lifelong learning process, that is, allowing each one the ability to know how to conduct their life in a world where the speed of changes allies with the phenomenon of globalization, in the which requires a high degree of competitiveness that more than ever will require the willingness to learn and relearn continuously.

The teaching-learning process has been studied from different approaches and methodologies, it is important that we make a reflection on this to understand if the mentioned binomial is really occurring.

Fernández (1998), quotes that “the reflections on the teaching-learning process allows us to identify a movement of ideas from different theoretical currents about the depth of the teaching and learning binomial”.

“Usually, the different authors analyze the approaches to the teaching-learning process based on its principles, the components necessary for the educational phenomenon and its effects on the individual and society” (SANTOS, 2005).

The effectiveness of the teaching-learning process is in the response that it gives to the absorption of knowledge, to developments such as the intellectual and physical, to the formation of feelings and attitudinal values that reach the objectives proposed in different institutions and at each level of education, leading to a position that produces changes and that, based on collective actions, encourages solidarity and community living.

The use of pedagogical workshops as a teaching-learning process is seen from the concept that education is the construction of knowledge, since, in this pedagogical practice, we are able to achieve the expected objectives from the facilitation of teaching procedures, going from against the National Curriculum Parameters (2000), when they say:

Daily needs make students develop an essentially practical intelligence, which allows them to recognize problems, seek and select information, make decisions. When this capacity is enhanced by the school, learning has a better result (PCN, 2000, p. 37).

The pedagogical workshop presents itself as a methodology option in which, based on specific practices,

it proposes direct contact between the instructor and the group of students.

Lorenzon et. alli. (2009) cite that "the construction of knowledge from projects in the community presupposes an objective that gives unity and meaning to the various other activities, creating instruments that facilitate the fulfillment of pedagogical requirements".

Pedagogical workshop is a group work methodology, characterized by the collective construction of knowledge, based on the analysis of reality, confrontation and exchange of experiences, in which knowledge is not only the final result of the learning process, but also in the knowledge building process, thus, a teaching-learning relationship develops in which educators and students build together the results of the pedagogical process (PAVIANI and FONTANA, 2009).

In the pedagogical workshop, there is a more humane relationship, in which students' culture and values are respected, so that there can be more contextualized learning. There is a complicity between students, teacher and the instructional resource allowing the construction of knowledge.

Bastos & Bustos (1989) state: “Workshop is a new pedagogy of knowledge and insertion in the reality that develops at school, it is a pedagogical process in which students and teachers challenge a set of specific problems.”

And according to “Prado (2010)”

In the pedagogical workshop, the student learns in the process of producing, raising doubts, researching and creating relationships that encourage new searches, discoveries, understandings and reconstructions of knowledge, therefore, the role of the teacher is no longer the one who teaches through transmission of information to create learning situations, whose focus is on the relationships that are established in this process, leaving the teacher to carry out the necessary mediations so that the student can find meaning in what he is learning.

The choice of stingless bees to work with the pedagogical workshop was mainly due to the great utility that bees have for man, being the main pollinators of floral species, guaranteeing the production of fruits and seeds,

which are widely used in human food. . We can also mention that this is an educating society adding the three values that are attributed to the producing species: market value, convenience value and moral value.

In Brazil, stingless bees make up approximately 300 species, most of which produce honeys of great reputation and although producing less honey, meliponines have the important role of providing a product that differs from *Apis mellifera* honey, mainly in differentiated flavor and aroma, reaching high prices in the market (ALVES et alli., 2005ab).

Meliponiculture has the advantage that its bees are docile, do not require clothing and special equipment and their creation is of low operational cost. From the hives it is possible to extract honey, propolis and wax, products valued in the national market, as well as their swarms. In general, stingless beekeeping does not take up much time and can generate extra income for families, especially women, young people and the elderly.

In addition, the conservationist character of this creation is emphasized, a branch that is still emerging and that has been standing out in projects of Environmental Protection Units, opening new paths such as ecological tourism, in fact, it is the wild bees responsible for maintaining the biodiversity of the tropical habitats.

The reflection on social practices, in a context marked by the permanent degradation of the environment and its ecosystem, creates a necessary link with environmental education. In this sense, meliponiculture becomes an easily accessible and highly effective instrument, contributing to environmental awareness.

Environmental education focuses on the sustainability and preservation of ecosystems, as mentioned by "Jacobi (2003)",

The notion of sustainability implies a necessary interrelation of social justice, quality of life, environmental balance and a break with the current development pattern. Thus we can insert in this process, the bees, which besides being social insects, participate in a remarkable way with their daily work of pollination and food production, participating in this context of environmental preservation.

"In Brazil, stingless bees are found in all ecosystems, being responsible for 40 to 90% of the pollination of native plants" (MATEUS, 1998).

The objective of this research was to evaluate the efficiency of the pedagogical workshop as a tool for teaching the creation of stingless bees.

II. MATERIAL AND METHODS

The research was carried out at the Federal Institute of Espírito Santo (IFES) Campus Santa Teresa, municipality of Santa Teresa, state of Espírito Santo, whose altitude is 150 meters and the average annual temperature is 24°C, with rainfall between 900 and 1200 mm. "It is located in the mountain area of the state of Espírito Santo, with its highest part at 1030 meters above sea level and the municipal headquarters at 665 meters above sea level" (PAIXÃO, 2009). "The municipality has approximately 21 thousand inhabitants, divided into approximately 11 thousand inhabitants at its headquarters and 10 thousand inhabitants in the interior" (PAIXÃO, 2012).

Seventeen students enrolled in the technical course in agriculture integrated with high school participated in this research, with a predominance of males, who represented 75% of this clientele. Also 10 vacancies were made available for the participation of farmers living near the school, selected through an interview, as well as by two technicians from the Municipal Secretary of Agriculture and Economic Development of the Municipality of Santa Teresa, who provide technical assistance to participating producers. Most of the participating students were formed by young people from the rural area around the campus, where family farming predominates; there are isolated creations of indigenous stingless bees, which are practically devoid of technological features.

The research had a qualitative and quantitative focus, and the problem arises, first of all, from an inductive process that is being defined and delimited in the exploration of the context where the research is carried out. Therefore, such premises were observed in the proposed intervention area for the research.

For the workshop, basic notions on the creation of stingless wild bees were introduced, whose breeding practices require preliminary preparation. For this, the workshop was stratified into two components: on Ecology and on Creation Technology. The ecological stratum emphasized approaches on ecological attitude and actions for sustainable use. In the technical focus, the approach of

the bee workshop aimed to directly address the basic conditions regarding the technology of breeding stingless bees such as installation, origin of swarms (stand) and management.

The pedagogical workshop was held on 09/12/2011 in the Apiculture Sector of Campus Santa Teresa and was conducted with the division of participants into three groups, one of nine and two of ten people, to attend each stage of the workshop, which was presented in seven blocks, presented in three subjects, simultaneously, lasting 15 to 20 minutes. In order for all participants to pass through each block, rotating stations for the groups were adopted, so that each instructor repeated the subject three times, attending to all groups.

The content of the seven distinct phases were subdivided into three stages with different themes approach, which are: Phase 1: ecological part, with an introduction on Biology. The species, nesting and flora. Phase 2: technological part such as, good practices, facilities (the meliponário) and appropriate materials. Phase 3: bee products such as food and building materials. Phase 4: origin of the swarms (settlement of the meliponary). Phase 5: review and management techniques, such as strengthening the swarm and harvesting honey. Phase 6: ecological practices, the construction of a handmade box to prevent the purchase of wood, identification of some plants by the Campus, construction of a bait box. Phase 7: other species of bees, solitary.

The phases were supported by didactic materials to support the lectures, these being banners, easels and other didactic materials of daily use, specific materials that illustrated the part of the technology of beekeeping such as type of feeding, traps, standardized boxes, and others.

At the end of the workshop, a visit was made to the local meliponary, to assist in the application of knowledge. This practice was intended to evaluate a beekeeping in loco, so that the participants could identify their positive and negative points, as well as present suggestions for improvements based on technical and ecological criteria, already presented.

The researcher adopted the position of observer during the presentation of the workshop, to assess the behavior (attention, dispersion, interest) and the entire dynamics of this educational resource, and all activities were monitored and taught by professionals from IFES Campus Santa Teresa and from UFRRJ.

To collect these data, the educational concept (student participation, student-teacher interaction, content approach, evaluation of results) was used, with a view to

assessing the perspectives and raising impressions about the teaching method.

To assist in the evaluation of the pedagogical workshop, field research was offered, with a view to learning the participants. For this, a questionnaire was formulated and submitted to the participants moments before and shortly after the workshop. The questionnaire was formed by 50 objective questions, of multiple choice and divided into sections, to meet the proposed variables, and its construction was based on three variables: a) initial questions related to the identification of the participant; b) questions that assessed the level of knowledge about sustainability and the environment and c) knowledge about bees and the specific breeding of stingless bees.

The evaluation was carried out in a qualitative and quantitative way, based on the behavior and following items observed during the lectures given by the instructors. The following were observed: participation, student and lecturer interaction, the degree of interest in the topic, the quality of the questions and answers and proposals for improving the workshop.

For a specific assessment of the general performance of the workshop, we worked with IDAPI, a performance index on bee knowledge, now focused on learning in Meliponiculture. This index was proposed by Koshiyama (2011) and Soares-Neto (2011), and for its construction, a database was prepared, from the answers obtained from part of the questionnaire, obtained before and after its application.

The IDApi was prepared following the formula

(1):

$$IDApi_z = \frac{\sum_{i=1}^n (p_i | Z_{(k_i)})}{\sum_{i=1}^n \max [(p_i | Z_{(k_i)})]}$$

Where the $(p_i | Z_{(k_i)})$ is the weight p_i assigned to a practice k_i performed by the beekeeper Z ; and respectively the $\max [(p_i | Z_{(k_i)})]$ is the weight p_i maximum of the practice k_i . It is then deduced that $0 \leq IDApi_z \leq 1$; which means that the closer the score is to 1, the better your performance will be, otherwise, it has low performance in your learning.

Formula (2) best describes its composition in the themes:

$$IDApi_{Gera} = \frac{IDApi_{Instalação} + IDApi_{Povoamento} + IDApi_{Manejo}}{3}$$

It was proposed to categorize the IDApi score into three classes: weak, when $0 \leq IDApi_z < 0,50$; regular, if $0,51 \leq IDApi_z < 0,75$; and satisfactory, only if $0,75 \leq$

IDApiz $\leq 1,00$. This tool aims to facilitate the assessment of learning.

The results from IDApi were presented through exploratory analysis of the scores for each phase of the workshop, before and after its application.

All statistical analyzes were performed in the statistical package R (R DEVELOPMENT CORE TEAM, 2012).

III. ANALYSIS OF RESULTS AND DISCUSSION

The profile of the participants was generated through field research, carried out at the time of registration for the event. In the identification of the participant (Table 1), it can be seen that the workshop

Table 1- Description of the identification of participants in the pedagogical workshop on Meliponiculture. IFES - Campus Santa Teresa

Analysis factor	Frequency of Responses			
Place of origin	Santa Teresa - 45%	Others - 55%		
Gender	Male - 83%	Female - 17%		
Age range	≤ 18 years - 52%	> 18 years - 48%		
Education	Incomplete Elementary School 0%	Elementary School Complete 17%	High School 72%	Undergraduate School 11%
Works	Yes - 41%	No - 7%	Studies - 52%	
Activity	Rural - 66%	Commercial/industrial - 10%	Others - 24%	
Breeds bees	Yes - 28%	No - 72%		
Knows others breeders	Yes - 72%	No - 28%		

Author's Data

In relation to the level of knowledge, they are indicators of learning prior to the workshop, and, in the case of cultivation geared towards environmental conservation, assessing the ecological attitude concomitantly with the workshop is a fundamental prerequisite in this pedagogical technique. The group, whose base is ruralist, tends towards measures that involve applicability (Fig. 1), since they feel the negative

attracted participants from other locations, in the order of 55%, just beyond the headquarters municipality, Santa Teresa, within a diffusion radius close to 10 km. It is observed that there is male dominance (83%) to the proposed activity, with a relative predominance (52%) of the young age group (less than and equal to 18 years). As it is an educational activity in the educational center, it is not surprising that the majority of participants (72%) have completed high school.

Among the occupation of the participants, it is detected that 52% of them were still students and 41% were busy with their own work. Rural activity is the predominant (66%), with no highlight in the workshop for beekeepers (72%), although they present references (72%) about this creation in the region.

consequences in their daily lives, and indicate items that most directly affect their production activity (Fig. 2), the who shows concern for the destruction of the environment that surrounds them.

Among the ecological activities proposed for environmental conservation, tree planting stands out, possibly because the region is prone to deforestation, and its replacement is a necessity for high altitudes.

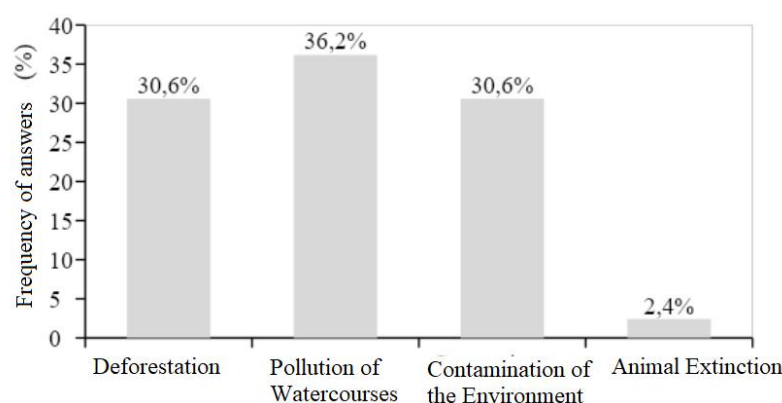


Fig.1 - Participants' reports (%) about the main environmental problems observed in their community

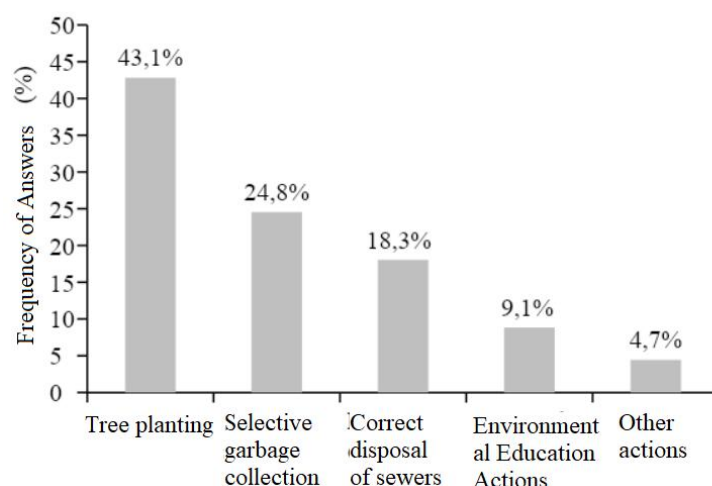


Fig.2 - Participants' reports (%) on which conservation activities should be encouraged

Signaling for the ecological position of their school, most of the participants mention that there is concern with the issue of the environment, and they were attentive that the release of sewage in water courses, the inadequate destination of garbage and deforestation.

It is noticed that the Environment theme is well consolidated in the working group. The majority (93%) declare that they have had good learning about environmental protection and that they participate significantly in seminars, lectures and other school events related to the environment and the majority (97%) consider that there is a need for more events related to the environment. environment through the school.

“Evaluation of learning through the workshop, is done through the IDApi indicator, it is an index that tests knowledge through a score”, recommended by Koshiyama (2011) and Soares Neto (2011), facilitating the identification of the performance.

Initially, the index is presented in its general format, generated from pre-selected questions segmented into basic and technical.

This index is presented in two stages: before and after the workshop. The general IDApi reveals the good performance of the learning group, the performance improves by 46% over the 0.61 score (regular). Based on these analyzes, it can be stated that there is an important difference ($p\text{-value} < 1\%$) between the average IDApi of the participants, before and after the workshop. Therefore, the course improved the students' general ability to discern the bees theme.

Before the workshop, the distribution of scores is concentrated in the weak and regular classes (86%); after the workshop, the group's classification rises well, the scores fall on the satisfactory class (94%). It appears that initially 86% of the participants are outside the ideal margin (satisfactory) and, after the workshop, only 6% are

outside the ideal margin. Figure 3 shows the distribution of scores; in the first Box, the median position in relation to the quartiles shows greater dispersion of scores than in the second Box (after the workshop). This means that the group had a good interest and the behavior was little dispersed when learning the theme about bees.

The workshop had an important challenge, since it was not possible to arrange the practices as desired by the public, because the theme was about conservation and because there was no creative model in the region that reflected a rational format. Thus, knowledge is more playful than practical, to motivate the group and generate positive results. The difference obtained in the variation of the results before and after the workshop can be attributed to the low content that the students had on the proposed theme, which reinforces the value of the learning facility that the workshops provide to the participants.

As the first experience on the subject, the workshop favored contact with the instructors, who are part

of the class at all times, and favored the possibility of manipulating the materials, at the moment when the knowledge is released. It is also noteworthy that some adverse factors may have appeared during the workshop, it is observed that they were not relevant, or that they had significant influence so that they could change the final results, confirmed in the responses after the workshop.

By segmenting the general IDApi, the result of the basic IDApi is presented, an index that assesses the participants' initial background on the theme of conservation and meliponiculture. The participants' performance was satisfactory, just over 50% over the initial knowledge score, a significant result ($p\text{-value} < 1\%$). This figure shows how the workshop worked on the theoretical part of the subject, improving the ecological attitude, which requires this theme. The averages of the basic IDApi scores show growth in the workshop participant's learning from the weak and regular scores (94% of the participants), towards the satisfactory score (89%) (Table 2).

Table 2 - Classification of students in IDApi Basic, before and after the workshop

Scoring Classes	Before the Workshop	After the Workshop
Weak ($0,00 \leq \text{IDApi} < 0,50$)	10 (35%)	0 (0%)
Regular ($0,50 \leq \text{IDApi} < 0,75$)	17 (59%)	5 (17%)
Satisfactory ($0,75 \leq \text{IDApi} \leq 1,00$)	2 (6%)	24 (83%)

Author's Data

Figure 3, in Box plot, best expresses this result. The position of the 3rd quartile of the post-workshop group is noteworthy, which means a higher tendency for high scores in relation to the median, when comparing the same group assessed before, whose individuals are distributed for high and low scores, apparently balanced.

According to the analyzes, it can be stated that there was a significant difference ($p\text{-value} < 1\%$) in the averages of students at IDApi Basic, before and after the workshop. Soon, the workshop substantially improved the students' basic discernment skills on ecological themes for bees from the pedagogical workshop.

The box plot (Fig. 3) shows the evolution of technical learning, rising to a satisfactory score, with only two individuals with inferior responses (outliers). In the Box before the workshop, the position of the 1st quartile shows more students who were unaware of the theme.

The workshop, with more theoretical than practical knowledge, managed to motivate the group and generated a positive result. As a first experience, the workshop favored contact with the instructor and the possibility to manipulate the materials. Another indicator that reinforces the value of the workshops refers to the difference obtained in the assessment scores before and after the workshop.

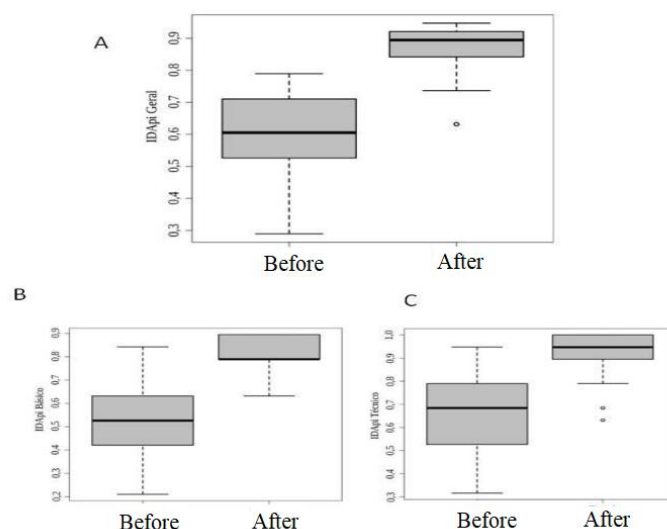


Fig.3 - Box plot A- general IDApi, B- basic IDApi, C - technical IDApi

Applying the technical IDApi, it appears that the workshop provided important technical information on the creation of stingless bees and they were well incorporated.

The yield was close to 40% on the initial knowledge baggage and, based on the analyzes, this difference is significant (p-value <1%) (Table 3).

Table 3 - Statistical parameters of the technical IDApi, before and after the workshop

Parameters	Before the Workshop	After the Workshop
Minimum	0,32	0,63
1° Quartile	0,53	0,89
Median	0,68	0,95
Average	0,66 [0,59, 0,73; IC 95%]*	0,93 [0,90, 0,96; IC 95%]*
3° Quartile	0,79	1,00
Maximum	0,95	1,00

*95% confidence interval of the mean

Author's Data

The averages of the technical IDApi scores show growth in the workshop participant's learning, from the regular score towards the satisfactory score (Table 4).

Management for the creation of indigenous bees, are well represented by knowledge about bees and are commonly attended in workshops and courses.

The themes covered in the workshop: Biology (Social organization), Installation, Settlement and

Table 4 - Classification of students in the technical IDApi, before and after the workshop

Scores of IDApi	Before the Workshop	After the Workshop
Weak ($0,00 \leq \text{IDApi} < 0,50$)	5 (17%)	0 (0%)
Regular ($0,50 \leq \text{IDApi} < 0,75$)	16 (55%)	2 (6%)
Satisfactory ($0,75 \leq \text{IDApi} \leq 1,00$)	8 (28%)	27 (94%)

Author's Data

Regarding the assessment of each theme (Tab. 5), the basic knowledge of the participants is considered satisfactory, and the growth in learning is close to 27%, well balanced in the themes. Management of Meliponários,

presents the largest baggage of knowledge, and the Installation of Meliponários, was the one that gathered more knowledge.

In the subject of Biology, with regard to the social organization of bees, information was introduced about who their individuals are, how they reproduce and are raised. Beehive products, which can be consumed by humans, such as honey, are well publicized in the literature and have good knowledge of the group about this product.

For Installation of Meliponário, questions about safety and flora are well established knowledge. Nogueira-Neto (1997) reinforces that “in addition to man, forids (flies), ants, thief bees, spiders, lizards, termites, certain lizards and woodpeckers are also enemies that the breeder must fear in the meliponary”.

The type of shelter of bees is another issue that requires special care, refers to the breeding box. In general, “the box must consist of the floor, nest, hickory and lid, which have very specific functions, namely, excrement storage area, maternity area, food storage area and part that allows for review, respectively” (NOGUEIRA-NETO, 1997).

In the subject of Settlement, it is mainly assessed whether the group recognized that nature cannot be attacked to sustain beekeeping. When pointing out that clusters should be avoided by cutting down trees, it is an indication of which group has consolidated the conservationist principle.

According to Marques-Souza (1999) “it is through honey that the creator recognizes the importance of surveying the melitophilous plants and, this triggers the conservationist principle of the explorer by the bees”.

Table 5 - Technical themes presented during a workshop on meliponicle exploration and average frequency of responses (%)

Thematic	Frequency of responses	
	Before the workshop	After the workshop
Biology (Social Organization)	64% \pm 13,76	88% \pm 10,83
Installation	59% \pm 16,18	89% \pm 12,84
Settlement	60% \pm 25,90	86% \pm 17,14
Management	68% \pm 25,93	96% \pm 3,84
Dados do autor		

Knowledge about the health condition of the colony is a key factor for the health of the meliponary. “To avoid stress, the colonies should be reviewed only on sunny days, without gusts, in the coolest hours (preferably in the morning)” (LUNA, 2007, NOGUEIRA-NETO, 1997).

In the management of the hive, the prevention of honey contamination requires the honey farmer to apply the precepts of good practices. Workshop participants were

However, Nogueira-Neto (1997) reports that “human beings are still the greatest enemies of meliponines, they devastate forests, prey and destroy their nests to collect their honey or, to sell the swarms”.

“In order to obtain swarms, indigenous beekeepers and scientists developed reproduction techniques and, by means of capture, idealized the trap-nest for this last case” (OLIVEIRA et. Alli., 2012). In Nogueira Neto (1997) there is information on artificial multiplication and the recommendation of bait boxes, to attract migrating swarms. “The artificial multiplication of colonies is an important mechanism for the conservation of stingless bees, since it can subsidize the repopulation of populations in degraded environments and prevent the predatory acquisition of colonies in natural habitats” (NOGUEIRA NETO, 1997).

The stocking of stingless native bee hives in the meliponary was well assimilated by the group, which recognizes the need for legalization at IBAMA, according to CONAMA (2004), and which establishes maximum stocking for this creation, after the breeder's inclusion in the Technical Register Federal - IBAMA CTF. This organ of the Ministry of the Environment did so to prevent predations and establish creations with a conservationist link, considering that native wild bees are part of the Brazilian wild fauna. In the Management, the group shows to have good notions on how to manipulate the hives in most of the questions (Tab. 5).

asked about the importance of hygiene, obtaining 100% assertive responses after the workshop.

According to Villas-Bôas (2012) considering that honey is a food, “it is important that all stages of its production are obeyed by the producer, in order to guarantee the safety of the consumption of this food, respecting its nutritional principles and preserving its organoleptic characteristics”.

Honey harvesting occurs when there is an abundance of food in the colony. Even though the participants did not have the opportunity to do this, the majority (97%) indicated that the honey harvest requires an appropriate time. Care emphasized by Carvalho et. alli. (2005) "due to the occurrence of fermentative processes, which interfere with its quality".

The issue of the use of pesticides is widely discussed when it comes to beekeeping, and students have shown good knowledge in this regard. Considering the themes developed, a relevant result was obtained, considering the increases in learning observed in the moments before and after the workshop (Fig. 4).

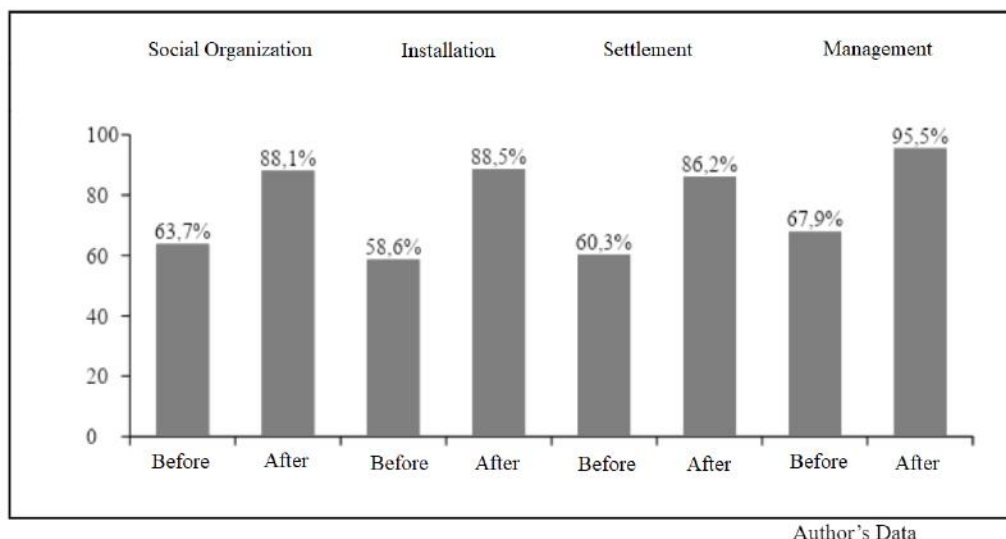


Fig.4 - Average results of the themes presented before and after the workshop on meliponiculture.

Finally, there was a question about the participants' answers that would allow them to seek to improve this pedagogical tool. The results reinforce that, even though the work in the workshop is diversified, the presentation of its themes must be better constructed. The workshop left a strong philosophical and practical impact on Brazilian bees. Although the majority of the group still wants the practice of creation, it is feasible that this cannot and should not be the main goal of this workshop.

IV. CONCLUSION

The pedagogical workshop confirms its efficiency, when it allows the construction or reconstruction of knowledge, the articulation of theoretical and practical knowledge, focusing on the reflection on practical knowledge, which together with the exchange of experiences allows rethinking traditional teaching methodologies. This methodology suggests an organization different from what is traditionally done, adapting the content to your specific group, favoring learning in a natural and conscious way.

The pedagogical workshop appears with a methodology with greater student participation, which establishes relationships, justifies, analyzes, discusses,

promotes meaningful learning, with the guarantee that the content will be won and the learning will be achieved, given the high rate of improvement in knowledge on the subject addressed before and after its completion, qualifying the high efficiency presented by the workshop in the teaching-learning process.

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