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TECHNOLOGY****DEVELOPMENT OF REFRIGERATION AND AIR-CONDITIONING TECHNOLOGY****Eugenio A. Ermac, Ph.D.**

Associate Professor V

Technology Department, College of Education

Cebu Technological University-Main Campus Philippines

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ABSTRACT

This study assessed the status of the refrigeration and air conditioning technology of the Cebu Technological University. It used the descriptive method of research to assess the status of the refrigeration and air conditioning technology of the Cebu Technological University System. It was found out that only seven percent of the faculty obtained Doctoral Degree and the nine percent were Master's Degree holders. Moreover, data revealed that there was a dearth in technical trainings in relation to technological advancement of refrigeration and air-conditioning technology. Hence recorded a very inadequate rating in conducting teaching instructions and in application of highly competent skills. In like manner, results disclosed that human resources were not fully developed regarding the knowledge and skills in refrigeration and air conditioning jobs so as refrigeration and air conditioning technology shops have still problems in teaching-learning process as to ratio of students to tools/equipment.

KEYWORDS: Human development, Refrigeration, Air-Conditioning Technology

INTRODUCTION

The dawn of the new millennium presented an opportunity not only to look ahead to the future, but also to reflect on the ingenuity and inventions of the past. Electricity, automobiles, telephones, radio, television, and computers are just a few of the innovations introduced by engineers in the twentieth century. The engineering principle on which it is based, mechanical refrigeration, has had even more far-reaching effects, through both refrigeration itself and its close cousin, air conditioning. Taken together, these cooling technologies have altered some of our most fundamental patterns of living [1].

The growth presented shows the importance of refrigeration and air conditioning technology in different ways of life. The air-conditioning and refrigeration center (ACRC) has two major goals: first, to contribute technology toward the development of energy-efficient equipment that uses ozone-safe refrigerants; and second, to provide a forum for manufacturers to coordinate research and share results at the pre-competitive stage [2].

MATERIALS AND METHODS

The study is generally quantitative in nature. One has to answer questions entailing qualitative and quantitative level of variables. Thus, particularly it employed descriptive statistical process. It collected and analyzed factual data that were easy to account. The respondents of the study were grouped as faculty, administrative staff, and the students. Probability sampling was used to determine these respondents, purposively in a randomized manner. The fifteen (15) administrative staff consisted 27% of those that were part of the administration; chairmen, directors, deans and campus directors of the three colleges. The ten (10) instructors/professors whom directly teach the subject consisted 18% and the thirty (30) students consisted 55% were randomly picked as follows; 20 from the main campus, and 10 from two (2) satellite campuses. The study used a survey questionnaire adapted from TESDA

National Standard of Competencies. The first part accounts for the resources of the colleges under study the administration and maintenance of these resources. To ensure the validity of the data due to the details which are highly technical, the researcher had to be present during the administration of the questionnaire of each campus. The second part gathered data on the perception of the three groups of respondents as to accountability, administration and maintenance of the resources the colleges under study would have. To make sure that these data were understood, the items were taken from the common practices and explanation was provided for items not easily understood by the common people.

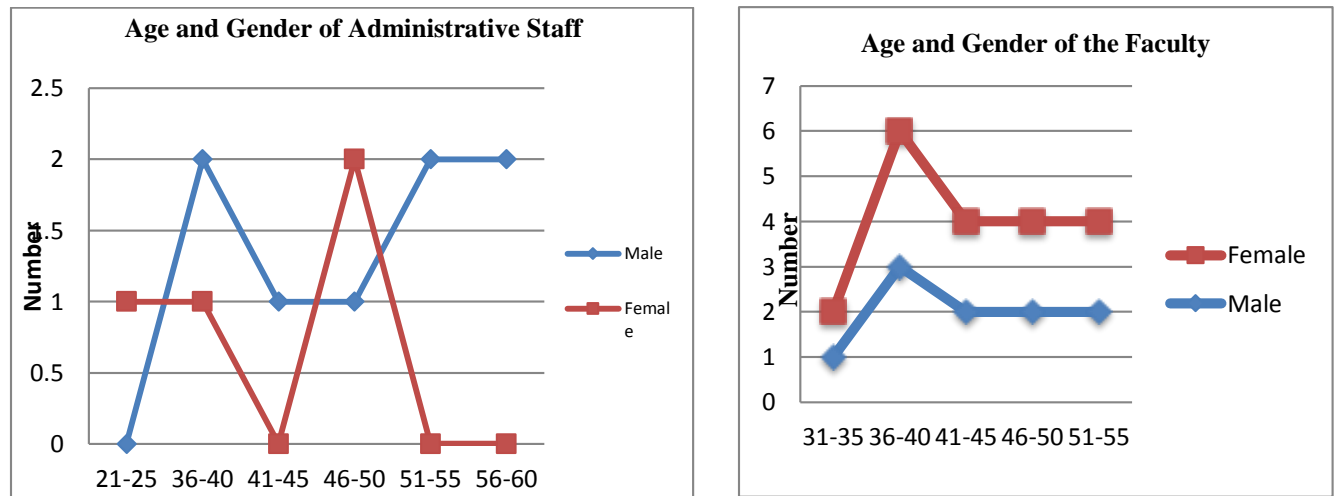
RESULTS AND DISCUSSION

Status of Refrigeration and Air conditioning Technology as to Human Resources

This section expounds on the status of refrigeration and air conditioning technology in the facets of human resources, to name: age and gender, educational attainment, technical qualifications and trainings attended, whether local, national and international.

Age and Gender. Figure 1 presents the age and gender of the respondents covered in this study. This poses great importance on the part of the administrative staff in the sense of gaining experience in managerial positions and the range of dynamism on the part of the faculty.

Figure 1
Age and Gender



Students	16-20	Count	30	30
		%	100.00	100.00
Total	Total	Count	30	30
		%	100.00	100.00

As presented in Figure 1, the most count for the administrative staff registered the age bracket of 56 - 60 years old with 33.3 percent; while 7.0 percent went to the age bracket of 21 – 25 years old. Of the 15 administrative staff, 60 percent were males and 40 percent, females. On the part of the faculty, 30 percent were at the middle range 36 – 40 years; while the age range 31 – 35 only got one count or 10 percent. All of the faculty were males. The students

comprised 55% of the total respondents of the study; they ticked the age range of 16 – 20. Likewise these were all males.

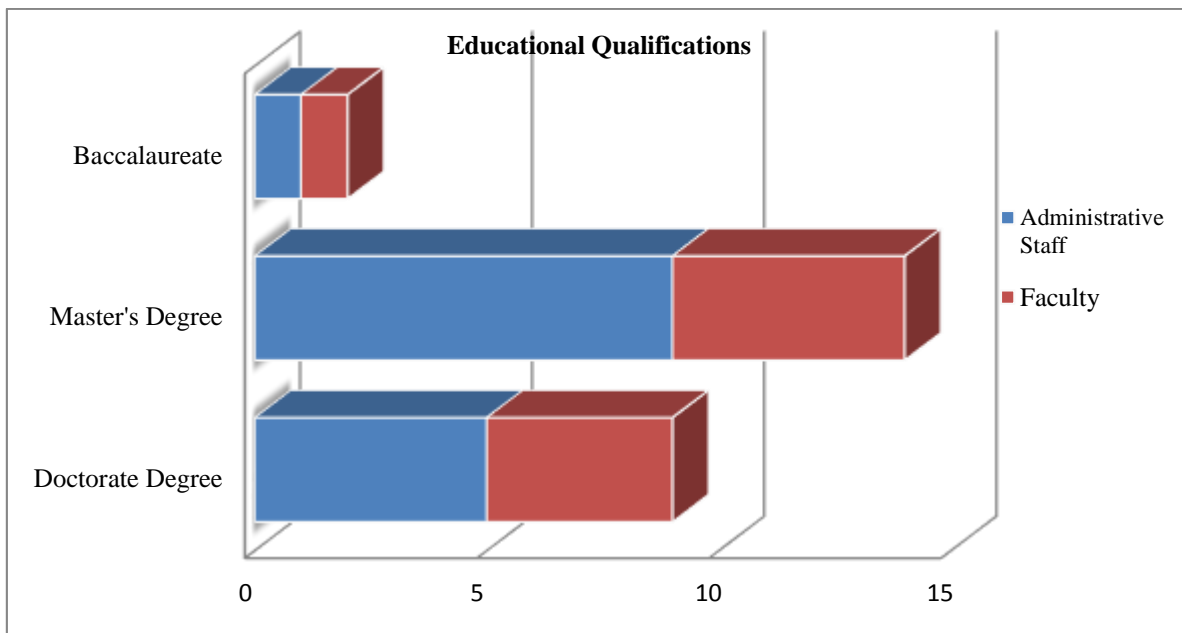
Furthermore, the findings pointed out that only male students are enrolled in the curriculum. The female students, on the other hand, must also be encouraged to enroll because even the Dep. Ed. Curriculum for basic education [3] includes RAC as one of the areas in the Technology and Livelihood Education subjects which require both boys and girls to take the subject.

It is implied that most of the administrative staff had gained enough knowledge and experience handling the organization and had been through the “ins” and “outs” in overseeing the operation of the school. Also, the faculty had passed the stage being idealistic and less realistic and thus able to transform real situation closer to what is ideal. This situation is akin to what Lastimosa [4] has asserted in one of his editorials.

Educational Qualifications. Figure 2 presents the respondents’ academic or educational attainment.

The educational qualifications of the two groups of respondents: the faculty and the administrative staff recorded that most of them or 25 percent attained the Master’s level, which was closely followed by Doctorate Degree at 16 percent. Fifty five (55) percent got the undergraduate students’ share.

Figure 2
Educational Qualifications



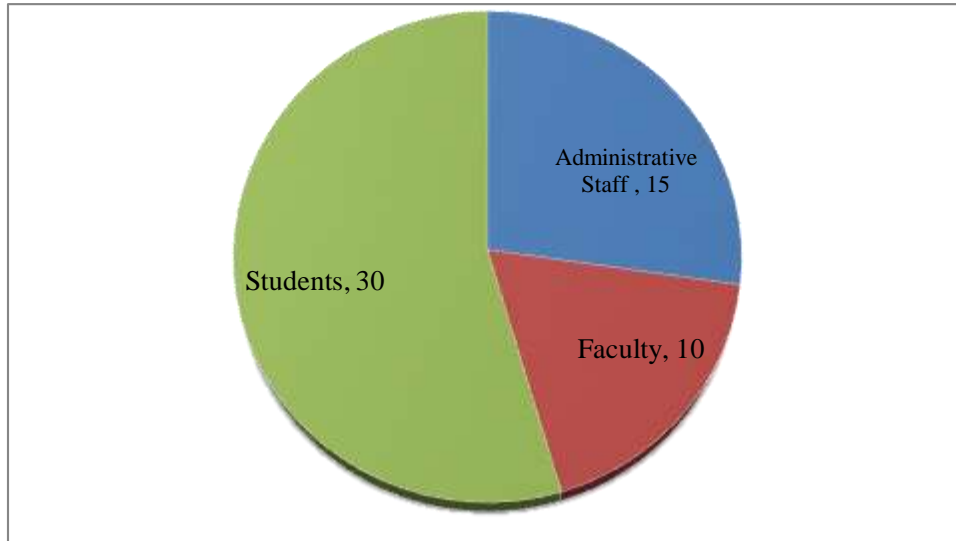
Students	Count	15	10	30	30
	%	27.0	18.0	55.0	100.0
Total	Count	15	10	30	55
	%	27.0	18.0	55.0	100.0

Of the fifteen (15) administrative staff, only one (1) had the baccalaureate degree; the rest were post graduate degree holders. These data clearly manifested that both the administrative staff and the faculty do their share in attaining higher educational qualification for the purpose of upgrading and maintaining quality education (ISO 9000-2001

clause 5.1 Management Commitment) [5]. That quality education can only be achieved by having the needed qualifications of those who manage the program; more so with those who implement the program. It is implied that both the administrative staff and the faculty adhered to the policy of continual improvement of its product (ISO 9000:2001 clause 8.5.1 Continual Improvement).

Technical Qualifications. Figure 3 presents the data regarding the technical qualifications of the respondents among the administrative staff, faculty, and students. The technical qualification refers to the National Competency Licensure conducted by the Technical Education and Skills Development Authority.

Figure 3
Technical Qualification



As shown on Figure 3, all or fifty (55) or 100 percent of the respondents did not even have acquired the National Competency License in refrigeration and air conditioning. Although, there were some faculty members who had acquired license in allied competencies, such as in electrical and mechanical technology.

Apparently, the administration as required by TESDA sees to it that the faculty must acquire the said license for the continuance of its operation of the technology under study. As presented in the TESDA training for Assessor's and Trainor's Methodology Course in the Philippine TVET Qualification Framework at least an instructor of the technology must have the NCII license [6].

Appropriate Trainings Attended. The next succeeding figure illustrates the appropriate trainings attended by the respondents, which are categorized into local, national, and international.

Local Trainings Attended. Figure 4 presents the local trainings attended by the respondents.

Figure 4
Local Trainings

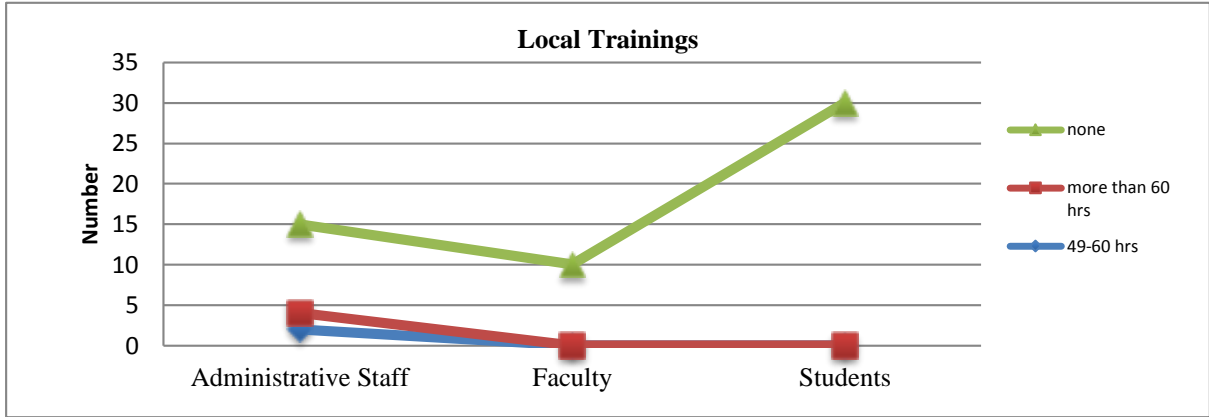


Figure 4 displays the number of accumulated hours in local training attendance. Notably, none of the faculty was sent to training. A few of the administrative staff comprising 2 or 4.0 percent had accumulated 49-60 hrs, and another 2 or 4.0 percent also accumulated more than 60 hours. Similarly, none of the students were sent to training.

This would mean that the administrative staff were made aware by partner agencies (where trainings are conducted), but may have overlooked to include the faculty to attend in trainings. As observed, the faculty was pre-occupied of the classroom activities and prioritized the shop activities, rather than forging linkages with other companies that would help introduce new techniques of performing technology tasks [7].

National Trainings Attended. Figure 5 presents the national trainings attended by the respondents.

Figure 5
National Trainings Attended

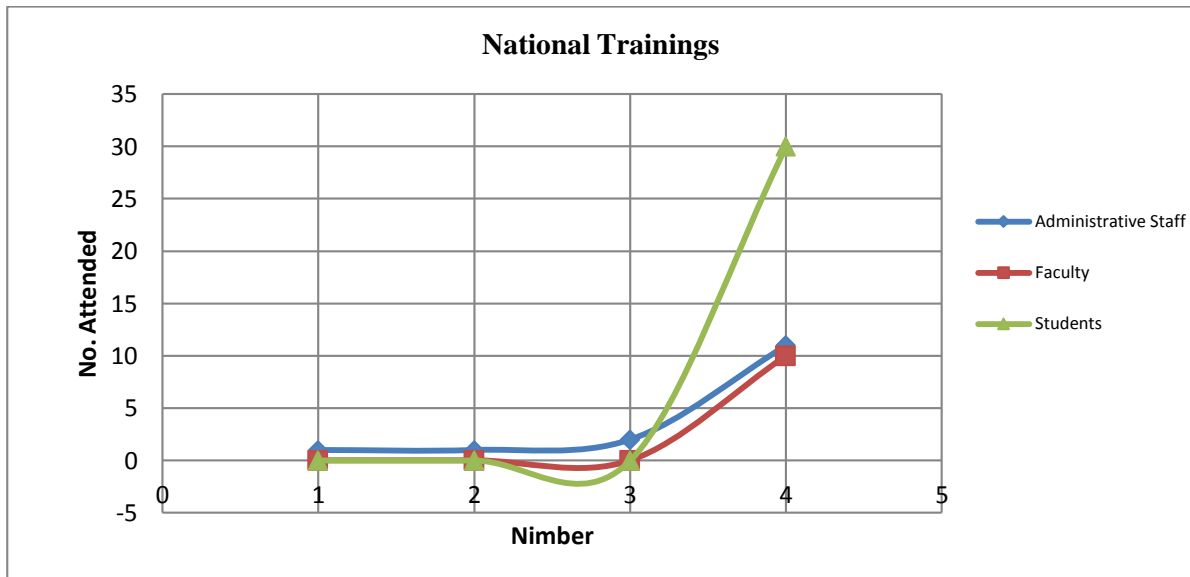


Figure 5 exhibits the range of hours of national training attendance. One (1) count or 2 percent each for both 1 – 16 hours and 49 – 60 hours training attendance was recorded for the administrative staff. There were other two (2) administrative staff or 4 percent whose attendance registered to more than 60 hours; yet majority of them (11 or 20% of the 15 or 27% of them) were not involved or were recorded to have no attendance to national trainings. Consequently, none of the faculty was sent to training; much the same with that of the students’.

This could be attributed to a situation wherein national trainings are seemingly rare. This could also be an indication of non-responsiveness of the faculty members who might confine themselves within the four (4) corners of the classroom [8]. More interestingly the management, on the other hand, needs to review its responsibility in the development of human resources as stipulated in Quality Management System Manual whereby the school is accredited.

International Trainings Attended. Figure 6 presents the international trainings attended by the respondents.

Figure 6
International Trainings Attended

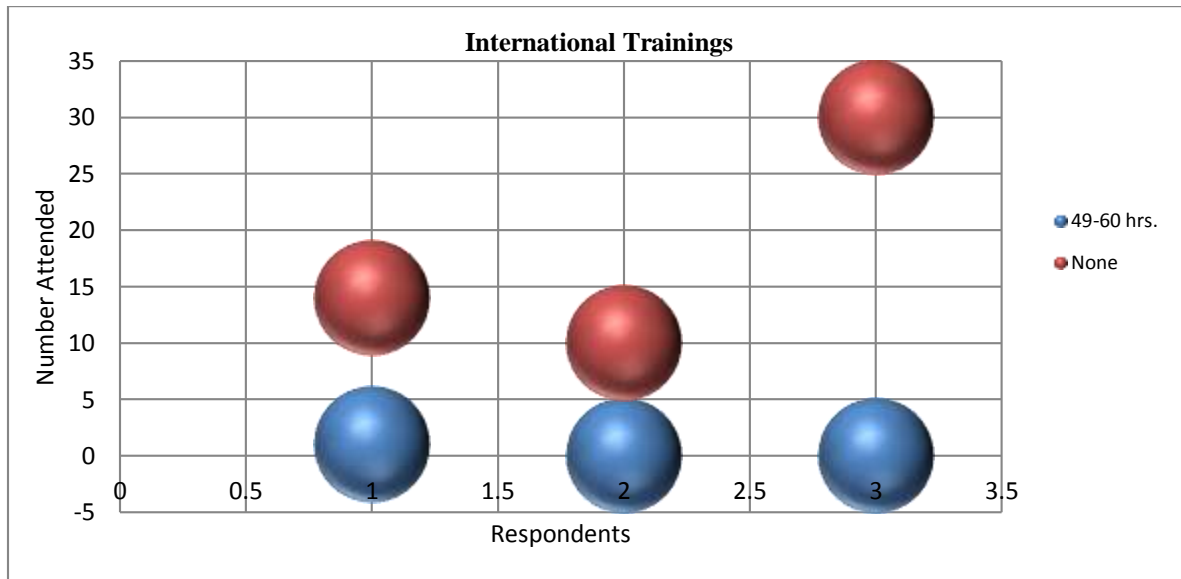


Figure 6 shows the need for international training attendance. Clearly, it is seen that only one (1) count or 2 percent for international training was recorded, that is, 49 – 60 hours training attendance by the administrative staff. Evidently, none of the faculty was sent to training, and so with the students. It can seemingly be attributed that none of the faculty was aware of what is happening in the global market today.

As what was generated from the unstructured interview, definitely the administrative staff that was sent to training some 10 to 20 years ago was already left behind in the recent technology development. On the contrary, it is clearly stated in human resource management affairs that faculty and staff be regularly sent to trainings as part of the faculty development program in the institution as stipulated in the Human Resource Management Program [9].

Level of Development of the Refrigeration and Air conditioning Technology

This section discusses on the level of development of refrigeration and air conditioning technology as perceived by the respondents, namely: the administrative staff, faculty, and students, in terms of human resource and material development. In the aspects of human resources, it updates global on the issues regarding ozone friendly refrigerants, repairs and diagnostics.

Human Resource. Table 1 presents the level of development of RAC technology in terms of human resource.

Table 1
Human Resource

HUMAN RESOURCE	ADMIN STAFF		FACULTY		STUDENTS	
	\bar{x}	VD	\bar{x}	VD	\bar{x}	VD
Updated with the utilization of RAC tools	2.13	PD	2.80	FD	1.93	PD
Updated with the utilization of RAC equipment	2.53	FD	3.00	FD	2.50	FD
Updated with the utilization of RAC instruments	2.47	FD	3.00	FD	2.40	FD
Knowledgeable of all tools	2.13	PD	2.80	FD	2.00	PD
Knowledgeable of all equipment	2.47	FD	3.00	FD	2.53	FD
Knowledgeable of all instruments	2.47	FD	3.00	FD	2.47	FD
Charge ozone friendly refrigerants	1.73	PD	2.80	FD	1.90	PD
Maximize use of charging cylinder	2.13	PD	3.00	FD	2.43	FD
Use refrigerant recovery machine	2.33	PD	3.00	FD	2.50	FD
Monitor both sides of refrigeration system while charging	2.00	PD	2.80	FD	1.97	PD
Use wire stripper in removing insulation of conductors	2.40	FD	3.00	FD	2.53	FD
Perform proper types of tube joints based on the standard	2.40	FD	3.00	FD	2.43	FD
Identify sizes of conductors properly	2.07	PD	2.80	FD	1.97	PD
Repair automobile air-conditioning unit	2.27	PD	3.00	FD	2.53	FD
Diagnose and repair troubles of industrial units	2.40	FD	3.00	FD	2.37	FD
AVERAGE WEIGHTED MEAN	2.26	PD	2.93	FD	2.30	PD
STANDARD DEVIATION	0.22		0.10		0.26	

Legend: 1.00 – 1.66 Under Developed (UD) 1.67 – 2.33 Partially Developed (PD) 2.34 – 3.00 Fully Developed (FD)

The table describes the perceptions of the respondents on the aspects of developments. Both students and the administrative staff recorded the means of 2.30 and 2.26, respectively and were translated verbally as **partially developed**. On the other aspect, the faculty had other insights and issues describing such development, with a mean of 2.93 or **fully developed**. All faculty respondents gave such rating closely as seen on the standard deviation of 0.10. Undoubtedly, the faculty rated each development aspect at best while the administrative staff and the students placed reservations.

Definitely this is the case of pure disagreement of perspectives. It is solely the responsibility of the faculty to keep at pace with updates on global issues, regarding ozone friendly refrigerants, repairs and diagnostics rather than bringing the issue to the management turn table for consideration of learning and imparting knowledge to the students [10].

The maximization on the use of tools and equipment lies within the structure of the faculty's mind being the first hand user and knowledge earner and imparter using such for technology enhancement. According to Corpuz (2007), the teacher is the facilitator in the classroom and is expected to possess knowledge, skills, attitudes, and values to be imparted to the students. Hence, his responsible discretion is to utilize these tools and equipment maximally.

CONCLUSION

Based on the findings of the study, it is concluded that there is a need for human development specifically in refrigeration and air conditioning technology. It is a demand for human resources to upgrade educational

qualifications by pursuing advanced studies, having themselves accredited by National Competency Standards and participating in sufficient and appropriate trainings to meet the needs of the clientele.

ACKNOWLEDGEMENTS

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