

—English Translation—

Peer Mentoring at the Universidad Europea de Madrid: An educational strategy for the development of general and specific competences

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Abstract: The current educational model for the European Higher Education Area (EHEA), demands a greater involvement on the behalf of students in all aspects of their education. In this respect, peer mentorship not only provides effective orientation for newly admitted students, a key element of quality in education, but also the active participation of students mentors, leading to the development of a wide range of skills in both mentor and mentee students. From a research-action perspective, this article describes a program of peer mentoring, in which the student interaction taking place leads to wide-ranging knowledge acquisition (knowledge and know how) for both participants. Within the sphere of mathematics, the program was developed with the aim of developing general skills, as well as the specific objective of improving competence in mathematics. In the results obtained, the profile and educational development of the student mentor, together with the study of the needs of first year students, from the perspective of teachers and students, were especially relevant. The conclusions and recommendations from this study may constitute a good basis upon which future peer mentorship programs may be developed as an approach that is very much in line with the EHEA and of great educational value.

Keywords: peer mentoring, student mentor, student mentee, educational strategies, teaching strategies, skills competence, competence development

The Brújula Program

The current model for higher education in Europe seeks integral student training, based on the acquisition of the technical and specific knowledge pertaining to each qualification, along with the development of a series of transversal skills that provide students with the necessary autonomy to meet the numerous challenges that arise throughout their personal and professional lives.

In comparison with more traditional educational approaches, which focus exclusively on the acquisition of knowledge, this educational model implies a greater degree of student co-responsibility and a more active student involvement in every aspect of his/her education. Taking this approach leads to interesting learning opportunities, such as student participation in university guidance services. Consequently, peer mentoring, defined as personal academic guidance provided by a student in his final years of study (mentor) to a newly admitted student (mentee), is

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emerging as a suitable strategy for the development of general and specific skills within the context of collaborative learning.

Teachers, assuming a guidance role, should therefore provide students with new learning environments, in which knowledge and experience sharing help new students to achieve integral learning objectives more effectively. On the basis of this perception, in the academic year 2006-2007, the Universidad Europea de Madrid embarked upon a program of peer mentorship, the Brújula program, in which final year students with excellent academic records and good interpersonal skills, were chosen to guide and advise newly admitted students throughout their first year at university. It was found that through this approach, both parties (mentor and mentee) were able to jointly develop general competencies in areas such as responsibility, team work, planning or communication, in spite of the fact that the students involved presented different levels of educational achievement. The climate of trust that can be generated through this type of guidance session was key to the success of the program. In these sessions, the guidance provided by more experienced students enables new students to gain first-hand knowledge of the university and the services that it offers, thus facilitating a more effective adaptation to the new environment. Moreover, as a distinguishing factor within the EUM, this peer mentorship program was carried out within the field of mathematics, with the objective of developing specific skills within this discipline, in an attempt to reduce the number of examination failures and students abandoning their courses, through a higher degree of personalized learning.

Far from being an isolated solution, this learning strategy was introduced as part of a student care program for newly admitted students and as a complement to the work carried out by EUM professors as part of a Tutorial Action Program.

From the perspective of a research-action program, with its own methodology (Elliot, 1990, Carr & Kemmis, 1988, Kemmis & Mc Taggart, 1988), the Universidad Europea de Madrid developed a mentorship program that was designed to adapt to the needs of first year students; through observation, the study of individual characteristics, the analysis of the participants and their evolution, and through a process of modification and improvement of the program, with the ultimate objective of improving the quality of the educational services provided at the University. In this article, we present some of the most relevant results that have been obtained since its initiation.

Methodology: Stages Within the Research-Action Program

The research-action program is a type of research that professors carried out to systematically examine the improvement of teaching practices with the aim of raising the quality of teaching through a process of retrospective reflection. The cycle of research was divided into four time periods: planning, action, observation and reflection.

The different phases of research are presented below.

Action Hypothesis and Approach

Peer mentoring as described by specialized authors (Dalton, Thompson & Price, 1977; Hall, 1976; Levinson, Darrow, Klein, Levinson & McKee, 1978; Kram, 1983) has traditionally been used within a business context as a support strategy to provide direction and feedback, with the aim of contributing to personal and professional development through active interpersonal exchanges between mentor and mentee.

Within the context of higher education, this type of guidance requires the creation of innovative educational strategies that promote both academic and administrative support and orientation for newly admitted students, in an attempt to facilitate a rapid and effective adaptation to the university environment.

The first mentoring programs applied to higher education were carried out at English speaking universities (Lobato Fraile et al., 2004) in which several objectives were established: to provide support to students, particularly those presenting major deficiencies in specific learning areas; to help students acquire complementary skills in their education; to avoid possible failures; to improve foreign student integration; and to guide students through minor research projects, etc.

In Spain, the use of university peer mentoring or tutoring has emerged with the objective of facilitating the transition from secondary to University education, and to provide guidance in academic, administrative, and social spheres (Valverde et al., 2004).

In the light of this experience and the results obtained, it is clear that under certain conditions, peer mentorship can be highly effective and is clearly becoming an important educational tool in this country. Interest in peer mentoring has mainly arisen due to an interest in improving the quality of university teaching and its adaptation to the requirements of society in general, and to improve student guidance services, within the context of the current changes occurring in teaching methodology.

Interaction among students is an effective knowledge construction mechanism that allows students to acquire multiple skills, which through other means they would have learnt more slowly or with greater difficulty. In contrast with traditional teaching, in which the transfer of knowledge is solely a teacher student based affair, new strategies, involving a greater student commitment to the learning process, are taking on a much more active role.

Along the lines of social constructivism (Ernest, 1998), we feel that although learning is still an individual activity, it occurs through a process of interpersonal interaction. In consequence, the most appropriate learning strategies are those involving a dynamic interaction among students.

It is hardly surprising therefore, that within this scenario, team work is acquiring a significant role in the classroom and that work involving cooperation among students is being encouraged. In a study carried out by Johnson and Johnson (1991) in which the individual approach was compared with the cooperative or collaborative approaches, it was concluded that cooperation increased interpositive relationships, and improved communication skills (using more and better language) and academic performance. When carrying out collaborative work, it is necessary to explain ideas to others in a way that presents knowledge in an accurate, correct, integrated and organized manner.

For these reasons, peer mentoring is an educational strategy to be taken into consideration, as a means to enable students to attain the knowledge and skill required to succeed at university and to fulfill the wider objective of constructing a knowledge based society. However, it should not be forgotten that in order to guarantee the success of peer mentoring, it is necessary to create the appropriate conditions to carry it out.

In this study, our aim was not only to improve the adaptation of newly admitted students, but also to exploit the relationships among them as a means to improving academic performance in Mathematics, through the development of specific skills in this subject, together with other more

general abilities in areas such as communication, responsibility, commitment, self-confidence, planning and leadership, and technological skills, etc. The methodology and design of this peer mentoring program falls in line with the aim of European Higher Education Area to achieve integral student education, and has been given the name The Brújula program.

Action

Embarking upon a mentoring program requires a high degree of organization and detailed planning. In order to achieve the desired objectives, it is necessary to create the conditions which ensure that the guidance given will provide a reasonable guarantee of a successful outcome. Undoubtedly, the task in hand requires a high degree of cooperation. Given that it involves several different types of individuals within the university community, it is essential to ensure that internal communication and volunteer recruitment (mentors, mentees and professors), function properly from an early stage.

In our program, once the different early development phases of the program had been established (dissemination, recruitment of participating students, mentor training, group formation, monitoring, reports and assessments, reflection, and improvement proposals), a timetable outlining how and when these were to be carried out was drawn up.

One of the most prominent reasons for using an investigation-action approach as a method of research was that it has allowed us to carry out our research on a cyclical basis, in which the program could be reformulated from one cyclical period to another according to requirements. This provided us with the flexibility to rectify any difficulties as they arose and to be able to carry out improvements to successive cycles. Any problems encountered could therefore be solved, while improvements to successive cycles could be introduced on the basis of the reflections made at the end of each cycle.

This mentoring programme has been under development since the 2006-2007 academic year. Of the various peer mentoring systems in existence, a formal, planned, intentional or systematic approach was used, in which the objectives and benefits of the program are clearly identified, with a high degree of supervision and monitoring. Furthermore, of the different forms of mentoring that may be used, a group mentoring approach was chosen, in which mentors tutored 3 students, in an attempt to encourage team work among the participating students.

Student participation in the program was completely voluntary. Mentor students were selected on the basis of academic records and interpersonal skills, while those encouraged to participate as mentees were students who had initially shown a deficient level of academic achievement. After selection, mentor students were given specific training to carry out tutorship, based mainly on the learning of how to use the tools available to carry out effective guidance, in accordance with the objectives of the program. On the conclusion of training, groups were assigned to each mentor. Mentors were to carry out half hour guidance sessions on a weekly basis.

Although the different groups were allowed to function independently, monitoring was carried out by the teachers responsible for coordinating the program, to ensure that objectives were fulfilled and that problems could be solved as they arose. This monitoring process is considered essential to the success of the program, given that it provides support to the mentor, avoiding the feeling of being left alone, and permitting the early detection of any problems. Meetings were held and daily mentor reports were made to describe reflectively how the work carried out was perceived by the mentors themselves.

Observations

Observations were made of the activity itself and how the participants reacted to the activity. This information was considered a crucial part of the research-action process, given that the information obtained provides an essential insight into the results and effects that the action taken has achieved. Given the particular nature of educational research, the need to carry out a qualitative study of the process is highly evident. In this study, the observation of participants, the use of discussion groups and participant interviews, together with questionnaires and document analysis were employed as observational techniques. After validating the information obtained from these data collection methods, the information was organized for its subsequent analysis.

The sample groups consisted of a total of 46 mentor and 97 mentee students studying for varying qualifications at the Polytechnic school, Faculty of Social Sciences and Architectural School of the Universidad Europea de Madrid. This group represented the total number of students that had participated throughout the four years of the program (06/07, 07/08, 08/09 and 09/10), and were directed by four teachers that had previous experience in student tutoring. Three teachers belonged to the Science Department of the Polytechnic School, while the other teacher belonged to the Vice-rectorate of teachers and academic innovation.

Reflection

Reflection, understood as the process of extracting significance from information, involves the analysis of all the observations made. The process of analysis was carried out after collecting the data, reducing the information obtained, (through a process of categorization and codification) and representing and interpreting the information. Different methods were used, involving content and descriptive analysis of data along with the triangulation method.

Some Relevant Results

The results may be divided into different groups in accordance with category of participating student.

With Respect to the Development of University Mentoring Program

The peer mentoring program Brújula Program, carried out over the past four academic years at the EUM, is a dynamic program that has been able to adapt to the different requirements of students, determined on the basis of their remarks and contributions. In order to provide a response to these requirements, we carried out a study of the difficulties encountered by first year students on arrival at the university, from the perspective of both teachers and the students themselves, thus enabling us to gain a comprehensive insight into the reality of the situation, through a study of the coinciding and diverging points of view that arose.

This information was collected from two surveys (one for teachers and the other for students) in which questions common to both were asked, in order to make comparisons between the responses given by either group. The selection of sample units for each group was carried out for questions of a practical or applicable nature, either casually or incidentally (directly or intentionally selected individuals). The students chosen for questioning were those to whom we had easy access (students attending lectures), while contact with professors was made through the heads of the different departments involved. The sample consisted of 107 students and 27 professors representing 87% and 69% of the total, respectively.

The results showed that the main problems faced by first year students at the EUM are concerned with study habits (or the lack of them), the different teaching methods used in comparison with pre-university teaching, the need to create new social relationships with fellow students and the loss of family protection, as a result of studying far from home. It is also interesting to note that as many as 50% of first year students would have liked to have had support on arrival at the university.

Professors also coincided with the opinion that one of the main difficulties facing first year students is the lack of good study habits (a lack of planning and constancy) and a low level of motivation. In addition to this difficulty, professors highlighted the students' poor level of linguistic competence and very little previous knowledge of mathematics. They also pointed out a lack of responsibility or emotional maturity in their students, as a difficulty to overcome on arrival at university.

With Respect to Student Mentors

As previously explained, one of the key figures in peer mentoring is the student mentor. Within the EUM mentoring program, the term student mentor is defined as a student studying the final years of his course, who has shown a high level of adaptation to the university; not only because of an excellent academic report, but also because he/she has shown a high level of interpersonal skills. Their role is crucial to the guidance program, given that they play the most important role in its development. An appropriate selection of student mentors is therefore essential, and depends on; the functions they will be required to carry out, their abilities and the training required to ensure they are able to successfully perform the guidance work in hand. For this reason, a thorough study of the student mentor figure was conducted. A total of 46 student mentors participated in the program, of which 31 were male and 15 were female, with an average age of 21.9 years of age.

Part of the study consisted of an analysis of the students' skills profile, obtained from a specific questionnaire designed to determine general skills. The skills profile of a total of 13 student mentors, selected from the different years, was assessed: 5 females and 8 males. Mentors from all years of the program were selected (some had participated on several occasions). A map of average skills (Figure 1) was then generated from their skills profile, which could be used to define the characteristics of EUM mentors. The percentiles of development of each skill reached by the student mentors, is shown on the map.

We studied the perceptions that students have of the role of the student mentor, including his/her qualities, functions, and positive and negative aspects of their work, as a means to gain a deeper insight into the role of mentor. Opinions were gathered from a number of different sources: from remarks made during training sessions, information gathered from the answers to questions relating to their role as mentors in their final reports and finally, from their reflections arising from the discussion groups of five student mentors. These sources provided the main body of information, which was subsequently, analyzed using a system of categorization of the common points arising from the different methods used. This system of categorization was inductively-deductively formulated through the data obtained after reading and re-reading the information provided by the participants, until the ideal mentor profile from the perspective of mentor students could be defined. The results are shown in Table 1.

Undoubtedly, knowing the qualities that a mentor should possess is very helpful when carrying out the mentor student selection process.

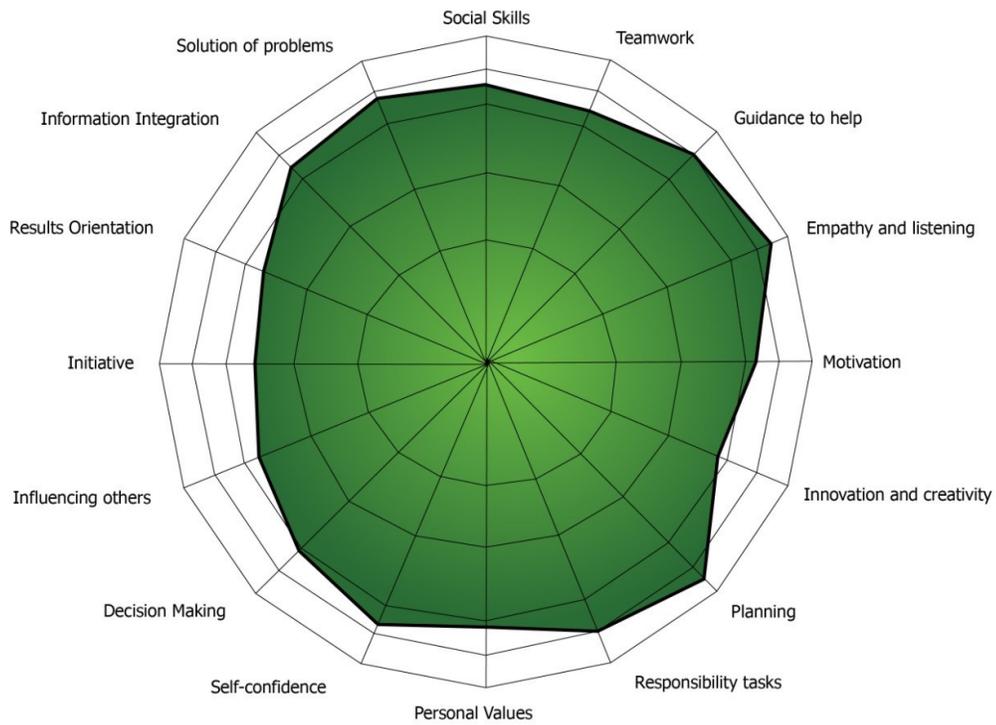


Figure 1. Skills development map of student mentors participating in the Brújula Program.

Table 1. The mentor skills profile from the mentors' point of view

Being	Knowing
Responsibility Empathy Communication skills Listening skills Patience Flexibility Self-confidence Leadership skills	Knowledge specific to course material (mathematics and physics) Knowledge of the University Study techniques
Know-How	Poise or Savoire-Faire
Good planner Academic, personal and administrative advisor Facilitator Informant Guide Motivator	Approachable Committed Good at creating a harmonious guidance

With Respect to Student Mentees

Throughout the successive years of the program, a total of 97 mentee students have participated, of which 64% were male students and 36% were female. We would like to point out that as in the case of the student mentors, the program was directed towards polytechnic school students, of whom the number of female students is considerably lower (86% male against 14% female).

One of the main objectives of the mentorship program at the EUM was to improve the academic performance of newly admitted students, in particular in mathematics related subjects through the development of competence in mathematics. This improvement can be measured through the academic results obtained in this subject. However, using this as the only measure of the program's success limits learning objectives; given that the objective of the program was to help students learn mathematics (through their skills) and to ensure that this learning was significant and lasting.

On the other hand, although some of the participating students who had presented difficulties in this subject did not succeed during the first year, they subsequently managed to learn the study techniques required and found new ways to confront mathematical problems. As a result, motivation and attitude towards the subject in these students improved leading to a better performance the following year.

In terms of academic achievement, the results obtained by students participating in the program were as follows:

- Of the 67% of students that did not drop out of the program, 72% passed the ordinary examination sessions, while a further 10% passed the retakes.
- 20% of mentee students that did not pass the end of year examinations managed to pass the failed subject during the following year.

The Development of General Skills

The observations made during the different research-action cycles over the years 06/07, 07/08, 08/09 and 09/10, identified ten general skills that participants in the Brújula Program developed in one way or another, according to the role they had accepted. In addition to their identification, the perception of development in eight of them by mentors was assessed (self-assessment).

- In the skill learn to learn, mentor students dominated and gained a deeper knowledge of the subject material, while improving the organization of their knowledge, so as to be able to transmit it to others. Additionally, mentors became aware of their own deficiencies, as well as those in others. On the other hand, mentees improved in study techniques, became more independent and made significant progress in learning the concepts being taught throughout the course. Improvements were also observed in active and participative learning.

The results from self-assessment reveal that over 90% of mentors agreed or totally agreed that learning occurs through teaching, and in the process of explaining study material to others, they become aware of their own deficiencies and those of others.

- With regard to the skill of organization and planning, mentor students were taught how to prepare and organize contents to be covered in the guidance sessions. This skill was described by the mentors themselves, as an important quality to possess in order to be a good mentor. In the survey, 93% of mentors regarded the organization and planning of the contents to be taught during the sessions as highly important.
- Mentor students made improvements in adapting to new situations by having a greater degree of autonomy, while mentees showed improvement through achieving a higher degree of integration into university life and by acquiring new learning methodologies.
- In technological skills students became better at handling the new forms of communication through the virtual platform and specifically through the mathematical software used in the guidance sessions.
- Teachers of first year students described communication skills as a matter for "further study" for many newly admitted students. Peer mentoring, helped mentors to improve their oral skills, reason more competently, and to express themselves in terms that could be easily understood by mentees. They also became adept at formulating questions that arouse curiosity and inquiry. In their reports, mentors highlighted the importance of communication skills for being able to carry out this work successfully, in particular in self-assessment, in which all agreed or totally agreed that its development was highly necessary.
- Given that guidance sessions were carried out in the form of group sessions, team work as a skill was essential in mentors, as a means to facilitating collaboration and cooperation among the students in the group, to solving problems on a group basis, and to encourage empathy among its members. Through the development of this skill, mentees were able to see the benefits of mutual help and collaboration.

Eighty-six percent of student mentors totally agreed on the importance of creating a good working atmosphere in tutoring sessions, as a means to achieving the objectives of the program.

- The capacity of leadership and initiative is a skill developed by mentors who feel responsible for the group and the contents and organization of the sessions. Proper management of a group requires one person to exercise leadership and to act as a model to be followed.

In this respect, mentors confirmed that they enjoyed taking on this responsibility.

- With regard to responsibility and commitment in self-assessments, many mentors felt that the progress made by their tutees depended on the help provided. Furthermore, all students believed that prompt arrival to tutoring sessions and prior preparation were important to ensure that time was spent usefully.
- Self-confidence and self-concept were favored by the spirit of fellowship, enabling mentees to acquire a greater feeling of confidence in their knowledge, to reduce stress and anxiety and to encourage the formation of good social relationships. In their self-assessments, mentors believed that the positive results in their tutees improved their own self-concept. Many of them expressed satisfaction at seeing how learning and motivation for the study of mathematics improved in members of their groups.

- One of the skills related to self-concept and self-confidence is motivation, which develops through a good assessment of one's work by others. Mentors feel personal satisfaction at carrying out their work successfully and seeing that their work is appreciated, while mentees feel more motivated after seeing an improvement in their own learning.

The Development of Specific Skills: Competence in Mathematics

As previously mentioned, one of the differentiating elements of this program was the objective of developing mathematical skills in participating students.

As we had already observed, many of the teachers of first year courses of technical subjects consider that many of their students are deficient in mathematical concepts and skills; leading to failure or discontinuation of the subject, with its consequent impact on other subjects in the course. In an attempt to mitigate these problems, appropriate guidance is required to permit personalized learning made possible through peer mentoring. Interaction among students with different levels of knowledge contributes to achieving an improvement in performance. Success does not lie so much in the concepts learnt in themselves, but in the skills used to learn them.

In our study, on the one hand, we identified the knowledge gaps in mathematics present in our first year students, and on the other, we discovered how to develop these skills through peer mentoring.

For this purpose, we gave students one questionnaire to ascertain basic mathematical concepts and another to determine student attitudes towards the subject. The results obtained were compared with the eight mathematics competencies as defined by Niss (2003): mathematical thinking, the setting out and solving of mathematical problems, mathematical modeling, mathematical reasoning, the representation of mathematical entities, handling mathematical symbols and formalisms, communicating in, with and about mathematics, and making use of support tools and materials.

Once the main deficiencies were identified in our students, the next step consisted in establishing how they could be overcome. This objective cannot be achieved in a general way, given that each student presents different levels of development in these skills and requires a personalized development plan to improve results. However, these objectives can be achieved through peer mentoring.

Conclusions

As we have described in this paper, peer tutoring or mentoring is a tutoring method in which experienced students in the final years of their courses (student mentor) with first-hand knowledge of university life, counsel and guide newly admitted students in different aspects. The main advantages of this type of tutoring arise from the affinity and empathy emerging between the students themselves, which is frequently not present in the student-teacher relationship, due to the generation gap; the absence of formalisms among students and the fact that guidance is being given by a person who has had experience within the same university environment.

In this research, we have been able to establish that mentoring benefits both the mentors and mentees and any other persons involved. In terms of general guidance, mentors develop different skills related to responsibility, self-confidence, leadership, communication skills, and team work, while at the same time improving their own knowledge of the institution. In parallel, mentees become more prepared to cope with university life, and develop personal skills and attitudes which aid in improving study techniques and academic performance.

As one of the basic principles in the development of mathematical skills, the personalization of the mathematics learning process can be carried out through peer mentoring. The climate of trust and the use of appropriate language used by mentors can contribute to bringing out the best in the tutees as mathematical thinkers.

On the other hand, the University itself benefits from peer mentoring programs, due to the improvement in educational quality. This type of guidance facilitates the adaptation of new students, bringing about an increase in satisfaction and helping to ensure continuation, due to a greater feeling of attachment to the institution.

A university that is adapting to the concepts of the new European Area must respond to current necessities. Notably, the Universidad Europea de Madrid, presents an educational model based on four fundamental pillars: The student themselves; acquiring a more prominent role in their own education, Internationality; encouraging the mobility of both students and teachers, the continual search for ways to improve educational quality in all services offered by the university; and the professionalization of the university, not only with regard to the training of future professionals in accordance with the demands of the labor market, but also to providing society with relevant research applicable to numerous fields of knowledge.

On the basis of these concepts, students are required to participate in all aspects of the services that it offers. The Brújula Program not only involves students in tutorial activity, but also in their own education and turning them into learning agents. Students should be progressively involved and actively participating in all the aspects of university life.

This approach to personalized guidance is perfectly applicable to other educational contexts, whose aim is to improve learning in other specific skills or even as a formula to facilitate the integration of other student groups that require special attention, such as students with disabilities or others who have specific needs. On the other hand, the internationalization of universities, brought about by an increase in student mobility, also requires the existence of guidance services and accordingly, the mentoring services given to international students may help to improve their integration into new environments.

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