

Influencia de la tutoría en el aprendizaje de matemáticas. Perspectiva del estudiante

Influence of Tutoring on Mathematics Learning. Student Perspective

Influência da tutoria na aprendizagem da matemática. Perspectiva do aluno

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Resumen

En México, en 2015, menos de 60 % de los jóvenes en edad de cursar bachillerato estaba inscrito en una institución educativa. La Universidad Autónoma de Sinaloa (UAS) implementó el Programa Institucional de Tutorías en 2006, pero no se conoce su impacto en el estudiante. Esta investigación tuvo como objetivo determinar si la tutoría es un factor de mejora del aprendizaje en la materia de Matemáticas I de la Preparatoria Mazatlán de la UAS, de acuerdo con la percepción de los estudiantes. Lo anterior, partiendo del supuesto que la acción tutorial mejora significativamente el aprendizaje en Matemáticas I de la Preparatoria Mazatlán de acuerdo con la percepción de los estudiantes. La metodología utilizada fue cuantitativa-descriptiva. Se recopiló la información por medio de una encuesta con preguntas abiertas tipo Likert, aplicada a 500 estudiantes de segundo

semestre de bachillerato. Entre los resultados más relevantes se obtuvo que los tutorados perciben disposición, confianza y respeto en el tutor, pero consideran una debilidad su conocimiento en la materia y el dominio pedagógico. Aun así, ven mejora en sus calificaciones y en su desempeño académico en la preparatoria. Además, preferirían recibir tutoría a través de Internet, pues consideran un área de oportunidad el poco uso que se hace de la tecnología como herramienta para la tutoría.

Palabras clave: aprendizaje, bachillerato, matemática, tutoría.

Abstract

In Mexico, in 2015, less than 60 % of young people were enrolled in an educational institution. The Autonomous University of Sinaloa (UAS) implemented the Institutional Tutoring Program in 2006, but its impact on the student is not known. The objective of this research was to determine if tutoring is a factor of improvement of learning in Mathematics course I at Mazatlán High School of the UAS, according to the student's perception, starting from the assumption that the tutorial action significantly improves the learning in Mathematics course I at Mazatlan High School according to the student's perception. The methodology used was quantitative-descriptive. The information was collected through a Likert type survey with open questions, applied to 500 students of the second semester of high school. Among the most relevant results, the tutorees perceived readiness, trust and respect in the tutor, though they consider their knowledge of the subject and the pedagogical domain as a weakness. Still, they see improvement in their grades and academic performance in high school. In addition, they would prefer to receive tutoring through Internet. They consider an area of opportunity the little use that is made of technology as a tool for tutoring.

Keywords: learning, high school, mathematics, tutoring.

Resumo

No México, em 2015, menos de 60% dos jovens em idade escolar estavam matriculados em uma instituição de ensino. A Universidade Autónoma de Sinaloa (UAS) implementou o Programa de Tutoria Institucional em 2006, mas seu impacto sobre o aluno não é conhecido. O objetivo desta pesquisa foi determinar se a tutoria é um fator para melhorar a aprendizagem em Matemática I da Escola Secundária de Mazatlán, de acordo com a percepção dos alunos. O precedente, baseado no pressuposto de que a ação tutorial melhora significativamente a aprendizagem em Matemática I da Mazatlan High School de acordo com a percepção dos alunos. A metodologia utilizada foi quantitativa descritiva. As informações foram coletadas através de uma pesquisa com questões abertas do Likert, aplicada a 500 alunos no segundo semestre do bacharelado. Entre os resultados mais relevantes, destaca-se que os tutores percebem a disposição, a confiança e o respeito no tutor, mas consideram seu conhecimento sobre o assunto e o domínio pedagógico uma fraqueza. Mesmo assim, eles vêem melhorias em suas notas e desempenho acadêmico no ensino médio. Além disso, prefeririam receber aulas por meio da Internet, pois consideram uma área de oportunidade o pouco uso que é feito da tecnologia como ferramenta de tutoria.

Palavras-chave: aprendizagem, bacharelado, matemática, tutoria.

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Introduction

Traditional schools have been recognized for a long time as the main institutional channel through which societies educate their young people, through the subjects offered during the semester or annual school year. Along with conventional schooling, the last decades have brought a rapid growth of parallel programs, through which students acquire knowledge and skills, almost always with the aim of reducing delays in learning in the classroom. The so-called tutoring is -as it was said- a way of teaching to diminish deficiencies in students with the need to reinforce knowledge in specific subjects. Asimiso, works as a complement to your regular education. It must be an instruction required for students who have fallen behind academically. When academic tutoring is needed, students should have the option to participate and do so voluntarily, as they provide students with additional instruction and enrichment opportunities to help them master the content of courses and study programs.

In order to demonstrate the above, mention is made of the investigations of Leung (2014) and Rohrbeck, Ginsburg-Block, Fantuzzo and Miller (2003). The first shows that peer tutoring has a positive impact on academic performance. The crucial determinants of the effectiveness of peer tutoring are identified and compared. On the other hand, the parameters of the program are evaluated, based on the concepts of role theory and interdependent group contingencies. In the second work, Rohrbeck et al. conducted a group comparison evaluating the interventions of peer-assisted learning with elementary school students, which produced positive effects that indicated increases in performance. These interventions were more effective with younger, urban, low-income and minority students.

Comfort and McMahon (2012) determined the effects of peer tutoring on academic performance in practical assessments of tutors and seniors in a Sports Science program. The group that received peer tutoring demonstrated significantly higher academic achievement compared to students who were not peer-educated and with previous cohorts who were not counseled by peers. In another study, the effectiveness of private tutoring at the baccalaureate level in Turkey was investigated by Berberoğlu and Tanse in 2014, through multiple linear regression analysis. It was inquired if the impact of private tutoring varies in different thematic areas, taking into account different characteristics related to students, such as family and school background, as well as interest and perception of academic success. In terms of thematic areas, the results indicate that,

although private tutoring has a positive impact on performance in Mathematics and Turkish Language, this is not the case in Natural Sciences. However, as the effect sizes demonstrate, this influence is not significant compared to the impact of other variables such as interest and perception of academic success, grade point average, parent education and socio-cultural background of students.

Guerra, Lima y Lima (2017) present the design, implementation and evaluation of a tutoring program to improve the academic performance of at-risk students enrolled in the last year of a degree in Nursing, characterized by academic failure (failed courses). They conducted an experimental study to evaluate a tutoring program that included a minimum of nine meetings conducted by an expert teacher as a tutor. Mid to high effects were found in the progress of the course, improving the information about the subjects, the comprehension of the information and the strategies to improve the performance. The response of the students of the intervention group highlighted the satisfaction and effectiveness of the program. The importance of the study lies in the reinforcement of formal tutoring as a tool to improve academic performance in students at risk.

Not only in Mexico is the problem of low academic performance perceived; since the 80s of the last century, this has been analyzed in all educational levels, which has risen to reach worrying values in the world. In developed countries like the United States, for example, it is a phenomenon that has reached the category of crisis; the use of Mathematics is lower than in other courses, to such a degree that, among the First World States, it is the lowest score, according to studies in primary education by Stevenson et al. (1990) and those of Stigler and Perry (1990). According to a baccalaureate research of McKnight et al., (1990), the average Japanese twelfth grade gets a score higher than the average of 5% higher than American students. Comparisons between the United States and Japan define the extremes, with most other First World countries somewhere in between. The contrast between the United States and Japan is much higher in Mathematics than for other subjects such as Reading. Contrary to the perception that we have, at least in the Mexican academic field, it would be interesting to discuss the possible causes of the low international position of the United States in mathematics education. However, in this paper only results of research on tutoring are presented as a factor of improvement in the subject of Mathematics at the baccalaureate level in a Mexican school.

The problem of low performance in Mathematics is explained in an extended way among the teachers of the different educational levels in Mexico by the deficient curriculum of Mathematics, for which they express their inclination towards an integral curricular reform, not only in this subject, but in the rest. However, it could be argued that the curricular reform is part of the problem and not the solution, in addition to updating the problem and teacher training, as well as funding for both reform and training, among others. In Mexico it is in a constant state of reform: a cohort has not yet concluded a curriculum when the new one is already being worked on; The results of a plan have not been evaluated and the new one is being initiated. Mexican teachers are faced with the need to change what they teach much more often than their peers in other countries.

Given the problems raised, it is necessary to recognize that technology is changing the nature of education and Mathematics are not the exception. We should take advantage of this situation. Each country faces the need to change its curriculum to face this fact. The need for curricular reform is a necessary consequence of social changes, but it seems unlikely that the level of student performance will change. Without other modifications, the students will have the same performance as with the previous curriculum.

In his research, *The Underachieving Curriculum - "The underperforming curriculum"* -, (1990), McKnight et al. offer explanations for poor performance in Mathematics. One of them has to do with the size of the class, which is the most widespread explanation among teachers. It is claimed that there is little relationship between class size and performance. Stigler and Perry (1990) state that, as class size decreases, teachers are increasingly tempted to individualize instruction to a single student or subgroup of students, interacting with them while others do not receive instruction. On the contrary, in large classes, teachers will spend more time teaching the whole class. This means that the actual time the student receives instruction is often less in the smaller class. Another explanation is the quality of the teachers; The last one is referring to the number of Mathematics courses that the student receives.

The first variable of human learning is time in the task. This does not mean that it is not important how you spend that time nor that you can waste your time learning useless things; the amount of what is learned is approximately proportional to the time devoted to learning. The second variable of human learning is time away from homework, the forgetting curve. The above leads to note the long holiday periods in Easter, December and summer. It is important to highlight the fact

that some important topics such as algebra are abandoned during vacations and other "gaps" in the curriculum, which are filled by other subjects, without saying that they are less important. Many times, teachers complain about their efforts to try to remind or teach students after summer vacations (Anderson, 1992). There are different attitudes that affect the amount of time and effort that is given to learning Mathematics. Numerous parents and students are convinced that achievement in this matter is a matter of skill, while others think it is a matter of effort (Stevenson et al., 1990).

Specifically in Mexico and the rest of Latin America, the current educational indicators in the different school levels are low. In 2015, in Mexico, less than 60% of young people aged 15 to 19 were enrolled in the education system (OECD, 2015). This is the age at which they should be taking the baccalaureate. From 2005 to 2012, the population aged 25 to 34 in Mexico that had reached upper secondary education increased eight percentage points, from 38% to 46%. However, this percentage is much lower than the Organization for Economic Cooperation and Development (OECD) average of 83%. Only one out of three adults aged 25 to 64 completed that level of education. Mexico is increasing the level of adolescents aged 15 to 19 who receive education: from 48% to 54% between 2005 and 2013 (OECD, 2015).

According to these figures, upper secondary education is in a critical situation, in which only half of the population of the age of attending the baccalaureate is served; the other half -the one who does attend school- should receive a quality education, in which the student is the center of the teaching-learning process. Due to this educational approach, the institutions implement tutoring programs, with which it is intended to improve student attention and reduce or avoid negative indicators such as low terminal efficiency, critical titling rates and, mainly, school dropouts.

A study by the Universidad Autónoma Metropolitana (UAM), published in the newspaper La Jornada, indicates that, currently, one of the highest dropout rates in Mexico is in the baccalaureate. According to data from the Ministry of Public Education (SEP), in the 2012-2013 cycle, 14.5% of the 3.3 million students enrolled dropped out of the courses (Sánchez Jiménez, May 7, 2015). In the Statistical Report of the Educational System in Mexico for the 2015-2016 school year of the General Directorate of Planning, Programming and Educational Statistics (DGPPYEE) of the Subsecretariat of Planning, Evaluation and Coordination -dependent of the SEP-, it was estimated

that for the 2015-2016 and 2016-2017 cycles, the percentage of students who finished high school and would enter high school would be 90.2% in 2016 and 90.4% in 2017, lower than 93.1% in 2015. Regarding school dropout, in 2015 it was 15.2% and it was expected that by 2016 it would decrease to 14.9% and in 2017 to 14.3%. Another important fact is the net school enrollment rate of 15 to 17 years, which for 2015 was 53.1% and it was projected that for 2016 and 2017 it would be 55.5% and 57.2%, respectively (SEP, 2016).

The above is worrisome, since according to the same OECD, adults with higher educational levels are more likely to be employed than adults with less education. In addition, the relative income of graduates increases with the level of education, and this happens in Mexico even more than in most OECD countries (OECD, 2015).

The increase in recent years in coverage of the baccalaureate in Mexico is due to the expansion of basic education and the gradual decline of the school-age population. In the upper secondary education camps, 4.4 million young people are being attended, 91.3% corresponding to the baccalaureates and 8.7% to the technical professional education. It should be noted that the increase in the coverage of the age group of 15 to 17 years has represented a significant increase, going from 47.5% in 2000 to 71.3% in 2014 (SEP, 2015). In Mexico, according to the OECD, for every 100 baccalaureate graduates, 74.8 enroll in a higher education institution. Although the percentage of students who continue their studies seems acceptable, in the 2010-2011 school year the continuity percentage was 83% and in 2000-2001 it was 87.2% (OCDE, 2015).

In many countries, tutoring is a vehicle for the transfer and appropriation of knowledge. In Mexico, the National Association of Universities and Institutions of Higher Education (ANUIES) created in 2000 Higher Education in the 21st Century. Strategic lines of development (ANUIES, 2000a), in which the vision of tutoring in higher education is formulated. Subsequently, this same association designed Institutional Tutoring Programs. A proposal of the ANUIES for its organization and functioning in higher education institutions (ANUIES, 2000b). Today, 17 years after the proposal was published, the educational institutions must have consolidated their tutoring programs and permeate the baccalaureate. It is mandatory to know their influence, establish comparisons and analyze their impact in each and every one of the subjects.

The Institutional Program of Tutorials of the Baccalaureate (PITB) of the UAS has as main objective to contribute to the improvement of the educational quality of the university

baccalaureate - through a process of attention, accompaniment and guidance during the formation of the students, in spaces and environments appropriate- to promote their proper and responsible performance in the academic field and their own integral development (UAS, 2015). The implementation of tutoring programs is a response to current academic challenges, in which it is required to keep students in the classroom, avoid abandonment, improve their learning, increase indicators and that quality is common and not the exception; in other words, respond to the current educational demand. The ANUIES expresses it in the following way:

Every educational program should aspire to the formation of the highest level of quality, both technically, professionally and scientifically, and in terms of the formation of the new citizenship. The IES, therefore, should take full advantage of the information and communication technologies that today enable the development of new learning experiences. Hence, tutoring is one of the fundamental strategies, corresponding to the new vision of higher education, as an instrument that can enhance the integral education of the student with a humanistic and responsible vision in face of the needs and opportunities of the development of Mexico. (ANUIES, 2000a).

The abandonment, the short terminal efficiency and the low academic performance in all educational levels is a worrying pedagogical phenomenon in educational institutions worldwide. Mexico is not only not exempt from this problem, but it is among the countries with the lowest educational indicators. The upper middle level - the case that concerns here - has a high incidence of attrition, disapproval and low terminal efficiency, both locally and nationally. This deficiency is observed, systematically, in each statistical report of the SEP when measuring the results obtained by the students in the standardized tests that are applied every year to evaluate the learning.

This research was carried out with the purpose of determining, by means of a quantitative-descriptive investigation, if the tutorial action is one of the variables that affect the increase of learning in the Mazatlan High School of the UAS, specifically in Mathematics I, according to the perception of the students. This would help in the comprehensive training of high school students to detect one of the variables that influence in achieving academic success, especially in one of the subjects that, historically, negatively affect the school career at any educational level. In addition,

this work provides authorities with useful information for rational decision making that positively impacts the education of high school students.

According to what was stated by the rector of the UAS in the Institutional Development Plan Vision 2017 (PDI), the University proposes, day by day, to improve its strategies and contents so that the generations of high school students, associate technicians, professionals and high-level researchers have a better education, as well as promoting internationalization as an effective means to achieve a more comprehensive and comprehensive understanding of their environment (Guerra, 2013).

The UAS, the educational institution with the highest coverage in the state of Sinaloa, according to the General Directorate of School Services, currently maintains enrollment of more than 140,000 students (UAS, 2017) and takes as a first-order function the generation of socially responsible beings, with the intention of generating an interdisciplinary learning that has to satisfy the maximum purpose of the institution: to provide an integral formation to its students (Guerra, 2013). In strategic axis 1, Teaching. Quality and educational innovation of the PDI, whose objective is to consolidate the quality, relevance and equity of the University's educational programs and services through permanent evaluation and innovation and the systematization of the processes, stipulates that the academics of the institution they must have postgraduate qualification in the field of knowledge to which they are attached, participate in the creation and dissemination of knowledge, carry out advisory and tutoring actions and involve themselves in permanent tasks of evaluation and updating of their teaching practice (Guerra, 2013). The strengthening of the accompaniment system in integral training is a policy of the PDI and one of its strategic objectives is to consolidate the Institutional Program of Tutorials (PIT) of the UAS.

Based on the foregoing, this research has the purpose of determining if tutoring is a factor for improving learning in Mathematics I of Mazatlan High School of the UAS according to the appreciation of their students, so the assumption that the tutorial action significantly improves learning in Mathematics I from the perception of students. With this objective and mentioned hypotheses, it is intended to contribute -in a part at least- to know how tutoring has impacted the educational system, specifically in the baccalaureate and its relationship with learning. As a guiding guide for this research, the following questions were written:

- What is the origin and normative framework that supports the Institutional Program of Tutoring in the UAS?
- What benefits do users get from the Institutional Tutoring Program at the UAS?
- What is the effect of tutorials on learning Mathematics I at Mazatlan High School of the UAS?

The different models of tutorials used in Mexico and the world -in addition to the conceptualization of tutoring in higher secondary education by researchers who have worked in this line in recent years- theoretically support research. Throughout history, there have been great personalities who used tutoring as a strategy to guide their students, among them Confucius, Socrates, Plato, Quintilian, Bell and Lancaster (De la Cruz, Chehaybar and Abreu, 2011). Currently, due to the need to account for all types of indicators -including the educational ones-, it is evident the abandonment, the reprobation, the low terminal efficiency that prevails in the academic field. This has led governments and institutions to recommend the implementation of mentoring programs. According to the ANUIES, mentoring is the process of personal and academic accompaniment throughout the training process to improve academic performance, solve school problems, develop habits of study, work, reflection and social coexistence (2002). Tutoring, understood in a generic way, implies the accompaniment that every person needs when carrying out any of the processes of existential development (Ariza and Ocampo, 2005). The tutorship consists of a mediation or facilitation work between the teacher, the students and the contents of the subjects (Cruz et al., 2008). In summary, the tutorial action is a support in teaching-learning, in which social and personal aspects are considered, in addition to the student's academics.

In Europe, mentoring has a recent history in several countries, with Belgium being the pioneer country in European orientation, as the first institute of pedagogical psychology in Europe was founded in 1899. In 1912, in Brussels, Christiaens created the first European Professional Guidance Service (Cobos, 2010). Simultaneously, guidance services were also being created to respond to this type of demand among young people in Germany, France, the United Kingdom and Spain (Repetto, 2002). In Mexico, the oldest record of tutoring that exists dates from the year of 1941 in the PhD in Chemistry of the Faculty of Chemistry, in which a tutor was assigned to each student to support him in his training as a researcher (Olvera, 2014) . Currently, most public educational institutions manage tutoring programs, for example, the University of Guadalajara

(UdeG) since 1992, Veracruzana University (UV) since 1997 and the UAS, since 2006. The latter has the Institutional Program Tutoring, regulation, tutors, peer counselors and tutors.

Methodology

A quantitative study of a descriptive or statistical type was carried out. The population was constituted by all the students of the second semester of the Mazatlan High School of the UAS of the morning and afternoon shifts, who already attended the subject Mathematics I. The primary unit was the classroom of the school. To obtain data, a structured survey was designed, self-completed by the student -guaranteeing anonymity-, divided into four categories: four open personal questions (name, age, sex, number of tutorials received); nine questions about the tutor (the tutor shows disposition, the tutor gives you confidence, the tutor respects you, the tutor is capable, the tutor has the appropriate training, the tutor has the pedagogy ?, the tutor knows the institutional regulations, the guidance received by the tutor has been useful for your learning, are you satisfied with the tutor?); 10 on tutoring in general (when necessary, have you been channeled to the appropriate instance?) Thanks to tutoring, have you integrated better with the institution? Do you prefer group tutoring? Do you prefer individual tutoring ?; Are you satisfied with the tutoring program, your learning has improved thanks to the tutoring, your grades have improved thanks to the tutoring, all your colleagues perform better thanks to the tutoring, do you prefer a system of remote tutoring through Internet? Are you satisfied with the tutoring you receive?); four on tutoring Mathematics I (thanks to tutoring, do you better understand Mathematics I?) Thanks to tutoring, did you improve on the tasks of Mathematics I? Thanks to tutoring, did you improve on Mathematics exams? I? Thanks to the tutoring, have you improved significantly in Mathematics I?). These last three categories are Likert type. The survey was distributed to the entire population during class hours in coordination with the teachers.

Previous studies have concluded that mentoring had a positive impact on academic performance (eg Leung, 2014, Rohrbeck et al., 2003). However, it is not clear if the type of research design used in the analysis can bias the magnitude of the effect of the tutoring. The above is a problem, since any generalized methodological characteristic that biases the effects in a primary study will also bias the estimates of the average effect size (Lipsey and Wilson, 2001). As an

example, for peer-to-peer tutoring, Zenelia, Thurstonb and Roseth (2016), have reported on a combination of average sizes of the effect of tutoring in previous analyzes: Table 1 indicates that the effect of sample size it varied from 0.26 to 0.75 per average and the number of study subjects (sample) on which these figures were based ranged from 11 to 72. Considering the results of the studies analyzed by Zenelia et al. (2016) and based on Table 1, it can be affirmed that the sample of this research fulfills the requirement to avoid bias in the results, since 539 students were surveyed and complete data of 500 of them were obtained.

Tabla 1. Análisis de correlación del tamaño de la muestra y el efecto de la tutoría par

Análisis	Características de la población	Efecto
Cohen et al. (1982)	Tutoría entre iguales con niños de 4 a 18 años; Matemáticas y Lectura. Totalizando 52 estudios.	0.40
Cook et al. (1986)	Tutoría entre iguales en estudiantes discapacitados; Matemáticas y Lectura. Totalizando 19 estudios.	0.59
Mathes and Fuchs (1994)	Tutoría entre pares en estudiantes con discapacidad; Lectura. Edad cruzada, misma edad, fija y recíproca. 11 estudios.	0.42
Rohrbeck et al, (2003)	Pares y grupos pequeños, edades 5.65-11.50, incluyendo estudios de menos de seis semanas; 40 de 90 estudios fueron tutoría entre iguales.	0.33
	Los estudios de aprendizaje asistido por pares, a diferencia de la tutoría entre pares en general, en los estudiantes de los grados 1-6. Total: 26 estudios de resultados académicos.	0.35
Bowman-Perrot et al. (2013)	Beneficios académicos de tutoría entre compañeros en los grados 1-12. Un total de 26 estudios de investigación de casos individuales.	0.75
Leung (2014)	Tutoría de compañeros de primaria, secundaria y estudiantes universitarios, incluidas las poblaciones con necesidades especiales; 72 estudios, incluidos estudios con menos de seis semanas.	0.26

Fuente: Zenelia et al. (2016)

Analysis of results

To determine the impact of tutoring on the learning of students of Mazatlan High School of the UAS, a survey was applied to the total population -539 subjects- and fully answered 500 students, who have received at least one session tutorial. Table 2 shows the enrollment of the first grade students of the aforementioned baccalaureate, of the 2016-2017 school year.

Tabla 2. Matrícula de estudiantes de primer grado por turno, dividido por género, de la Preparatoria Mazatlán

Turno	Mujeres	Hombres	Totales
Matutino	132	120	252
Vespertino	126	122	248
Totales	258	242	500

Fuente: Elaboración propia

Table 2 shows that the number of women and men in the first grade of baccalaureate is similar: 258 women per 242 men, 51.6% and 48.4%, respectively. A similar proportion is observed by turns: 252 students in the morning shift and 248 in the afternoon shift. Regarding the distribution by age, a concentrate was made in table 3.

Tabla 3. Distribución por edad de estudiantes de primer grado, dividido por género

Edad	Mujeres	Hombres
15	197	203
16	35	5
17	8	7
18	3	3
19	5	6
20	2	9
21	5	4
22	2	5
23	1	

Fuente: Elaboración propia

Table 3 shows that the highest frequencies occur at the lowest ages, 15 and 16 years, as expected, considering that they enter the high school at 15 years of age, regularly.

The study subjects were given nine statements with Likert-type responses about their perception of the tutor's performance. Table 4 shows the results, frequency (f) and percentage. 0 was used when "Does not apply" the question, 1 for "Rarely", 2 for "Occasionally", 3 "Frequently", 4 "Very frequently" and 5 "Always".

Tabla 4. Afirmaciones con respuestas tipo Likert sobre el desempeño del tutor

#	Afirmación	0		1		2		3		4		5	
		f	%	f	%	f	%	f	%	f	%	f	%
1	El tutor muestra disposición.	3	0.6	3	0.6	3	0.6	5	1.0	7	1.4	479	95.8
2	El tutor te da confianza.	5	1.0	7	1.4	9	1.8	9	1.8	12	2.4	458	91.6
3	El tutor te respeta.	0	0.0	0	0.0	0	0.0	1	0.2	8	1.6	491	98.2
4	El tutor es capaz.	0	0.0	23	4.6	34	6.8	43	8.6	34	6.8	366	73.2
5	El tutor tiene la formación adecuada.	0	0.0	39	7.8	73	14.6	90	18.0	83	16.6	215	43.0
6	El tutor tiene dominio de pedagogía.	0	0.0	54	10.8	69	13.8	81	16.2	101	20.2	195	39.0
7	El tutor conoce la normatividad institucional.	0	0.0	3	0.6	5	1.0	34	6.8	62	12.4	396	79.2
8	La tutoría recibida ha sido útil para tu aprendizaje.	4	0.8	1	0.2	4	0.8	6	1.2	5	1.0	480	96.0
9	Estás satisfecho con el tutor.	0	0.0	0	0.0	8	1.6	10	2.0	53	10.6	429	85.8

Fuente: Elaboración propia.

According to Table 4, 479 study subjects responded "always" to the statement "The tutor shows readiness", which represents 95.8%. Similar results were obtained to the statements "The tutor gives you confidence" (91.6%), "The tutor respects you" (98.2%). However, only 73.2% answered that "always" considers that "The tutor is capable". To the statement "The tutor has the appropriate training", only 43% answered "always", 16.6% selected "very frequently", 18% said "frequently" and the rest, 112 students, answered "rarely" or "occasionally" (22.4%).

To the statement "The tutor has mastery of pedagogy", only 39% answered "always", 20.2% opted for "very frequently", 16.2% considered that "frequently", 24.6% perceived that the tutor has mastery of pedagogy "rarely" or "occasionally". On the other hand, 79.2% of the study subjects considered that the tutor knows the institutional normativity when responding "always" to this

affirmation; 19.2% answered "very frequently" and "frequently" combined. As to whether the tutoring received has been useful for their learning, 96% answered "always" and 85.8% answered equally to be satisfied with the tutor.

The instrument also contains affirmations for the category of "tutoring in general". The tutors did not perceive having been channeled to the appropriate instance when a problem arose; only 89 of 500 respondents answered "always", 125 considered that "rarely" and 170 selected "occasionally", 79 said "frequently" and 37 "very frequently". Regarding whether tutoring has helped them to better integrate with the institution, 28 chose the option "not applicable", 238 "rarely" and 131 "occasionally", for a combination of 397 (79.4%) study subjects who did not perceive tutoring as a support in their integration.

In the same way, 94.2% of the respondents always chose to prefer group tutoring; 86.4% chose "rarely" to prefer individual tutoring. Although only 74 students said they were always satisfied with the tutoring program, 467 (93.4%) responded "always" to the statement "Your learning has improved thanks to tutoring"; 79.4% -397 students- considered that their grades have improved with tutoring by responding "always"; 16% selected "very frequently". Likewise, 72.2% also perceived an improvement in the qualifications of their classmates thanks to the tutoring, since their response was "always"; 91.6% responded "always" to be satisfied with the advice received, which is carried out by their peers. However, almost all of the respondents, 490 subjects, preferred a system of distance tutoring through the Internet, responding "always".

With regard to the specific category for the Mathematics I subject, 479 students always said they understood the subject better thanks to the tutoring; 473 responded in the same way to better understand the tasks due to the tutorials received; 459 tutors considered having always improved in Mathematics I exams for the support of tutoring; 480 students always perceived a significant improvement in Mathematics I for the tutoring received in high school.

Conclusions

This work shows -based on a quantitative-descriptive study- that the tutoring of the Mazatlán High School benefits the teaching-learning process by improving indicators of academic performance -specifically grades- according to the perception of the students themselves, so the above-mentioned assumption is accepted. They agree that tutoring helps in the improvement of grades due to the support received by the teacher-tutor and the advice of peers, peer counselors. The students (almost 92%) see the tutor with confidence and perceive respect for them (more than 98%), but consider as a weakness the capacity of the tutor (26.8%, more than a quarter) and their pedagogical knowledge (24.6% , almost a quarter, perceived that the tutor has mastery of pedagogy "rarely" or "occasionally"). The tutors consider that tutoring has been helpful in their learning, in general -says 93.4 %-, and for Mathematics I, in particular (95.8%). They perceive an improvement in their grades, jobs and exams (more than 90%). In addition, they consider that their classmates have also helped them improve their grades (89.2%).

On the other hand, a weak area is the little use that is made of technology as a tool for tutoring. This is always done in the classroom to all students or in small groups of five, six or 10 students. On occasion, individualized tutoring is also done in the classroom. The tutors believe that they should implement it through the Internet, although they are not clear in what way or with what platform they would carry out this activity. However, some say that social networks would be an appropriate tool.

Most research analyzes the benefits of tutoring on student achievement focused on the use of adult tutors. However, in recent years, high success rates have been achieved by working outside this model (Leung, 2014, Rohrbeck et al., 2003). In Mathematics, in baccalaureate, the benefits of peer tutoring (among the same students) -partite tutoring- could mean important support to their peers and as a measure to improve educational indicators. From the own experience of the authors, it is suggested that a friendly and individualized relationship between equals is essential for success. This requires a tutor who respects and believes in the student, who in turn must be receptive to advice and help. Students, free of social divisions between adult tutors and their guardians, have the best opportunity to establish this relationship. Peer tutoring has its own challenges, such as the lack of experience among volunteers and the difficulties presented by school programming. However, when implemented well, peer tutoring is a valuable tool to help students

overcome their difficulties, both in fundamental skills and in higher-level concepts. Through instruction and personal help, these students can discover the logic of mathematics and the opportunities it offers.

With evidence of their benefit, tutoring should be an integral component of education at any level, especially in students up to 18 years old, who require guidance and methodological guidance both in the school environment and in specialized areas of science. The tutors must be trained and capable teachers - with solid pedagogical bases -, respectful and respected by the students - who inspire their confidence and also serve as a guide in their journey through the school -, counselors in the academic and social fields - with sufficient knowledge of the management and normativity of the institution to channel its tutors to the appropriate instances before any situation or contingency - and with knowledge in the use of the technologies - that allow it to carry out or continue with its tutelary action from any place through the Internet- . The tutor is not an individual who knows everything, but he does have the ability to support the mentees and direct them to the instances that can solve their problems.

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