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Artículos científicos

Aprendizaje basado en proyectos como estrategia de formación profesional

Project Based Learning as a Professional Training Strategy

Aprendizagem baseada em projetos como estratégia de formação profissional

Martín Gerardo Martinez Valdés
Universidad Tecnológica del Usumacinta, México
mmartinez_ptc@utusumacinta.edu.mx
https://orcid.org/0000-0002-0953-0986

Resumen

El objetivo de la presente investigación fue evaluar si el aprendizaje basado en proyectos (ABPr) influye en el desarrollo de competencias de estudiantes universitarios. La investigación se desarrolló a lo largo de dos ciclos académicos con estudiantes de la ingeniería en Desarrollo de Negocios de la Universidad Tecnológica del Usumacinta (UTU), Tabasco, México, y empresas de distintos sectores productivos en un área rural. Para evaluar los resultados se diseñó un cuestionario de 12 ítems aplicado al inicio y término de las actividades de los alumnos. Entre los resultados se encontró una aceptación en la utilización del ABPr como estrategia de aplicación de saberes, en específico para realizar un diagnóstico, interpretación y establecer propuestas para la innovación de productos y servicios en un entorno empresarial. La estrategia de aprendizaje en cuestión promueve el trabajo colaborativo, el autoaprendizaje, la confianza, la responsabilidad y la integración del estudiante con un entorno profesional.

Palabras clave: aprendizaje basado en proyectos, competencias profesionales, formación universitaria.

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Abstract

The objective of this research was to evaluate whether project-based learning (ABPr) influences the development of competencies of university students. The research was developed over two academic cycles with Business Development engineering students from the Universidad Tecnológica del Usumacinta (UTU), Tabasco, Mexico, and companies from different productive sectors in a rural area. To evaluate the results, a 12-item questionnaire was designed, applied at the beginning and end of the students' activities. Among the results, an acceptance was found in the use of ABPr as a knowledge application strategy, specifically to carry out a diagnosis, interpretation and establish proposals for the innovation of products and services in a business environment. The learning strategy in question promotes collaborative work, self-learning, confidence, responsibility and the integration of the student with a professional environment.

Keywords: project-based learning, professional skills, university training.

Resumo

O objetivo desta pesquisa foi avaliar se a aprendizagem baseada em projetos (ABPr) influencia o desenvolvimento de competências de estudantes universitários. A pesquisa foi desenvolvida ao longo de dois ciclos acadêmicos com estudantes de Engenharia de Desenvolvimento de Negócios da Universidad Tecnológica del Usumacinta (UTU), Tabasco, México, e empresas de diferentes setores produtivos na área rural. Para avaliar os resultados, foi elaborado um questionário de 12 itens, aplicado no início e no final das atividades dos alunos. Dentre os resultados, constatou-se a aceitação da utilização do ABPr como estratégia de aplicação do conhecimento, especificamente para realizar diagnóstico, interpretação e estabelecer propostas de inovação de produtos e serviços em ambiente empresarial. A estratégia de aprendizagem em questão promove o trabalho colaborativo, a autoaprendizagem, a confiança, a responsabilidade e a integração do aluno com o ambiente profissional.

Palavras-chave: aprendizagem baseada em projetos, habilidades profissionais, formação universitária.

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Introduction

At present to speak of education is to speak of learning schemes and skills training. In doing so, resources, procedures and methods are considered that motivate the student, first, and that, secondly, contribute to developing skills and abilities for life (Valle, González, Cuevas & Fernández, 1998). In effect, the construction of knowledge must start from the interest of the student and the teacher and from there annex the formation of knowledge from cognitive activities whose purpose is the development of competencies (Meza, 2013). This constructivism refers to the application of strategies, proposals or action activities that support the formation of thought and, above all, competences, as it is the mediating part in the generation of individual capacities (Gutiérrez, 2018; Mendoza and Mamani, 2012) .

This makes it necessary to apply and develop activities whose purpose is to fulfill the purposes of professional training in real environments. Likewise, activities for the generation of professional skills, autonomous decision-making and collaborative development in the educational field. Integrate acquired knowledge and the formation of values and ethics in the student, all of which leads him to assume the responsibility of promoting paradigm changes in the technological, economic, social and cultural aspects.

Project-based learning (ABPr) is considered a methodology that promotes the interaction of a classroom reality. It promotes a change in the school pedagogical paradigm in the sense that it supports the generation of knowledge, implies a proposal for reconfiguration in the educational dimensions and implies innovation (Cascales and Carrillo, 2018; Medina and Tapia, 2017). Todd and Arredondo (2006) mention that public education requires efficiency, quality, student retention, linkage and flexibility of study plans, as well as curricular innovations for students.

This covers the ABPr and its application in the social context of perhaps unusual importance, because the student relates the contents of the subject or competence with a reality; an intervention towards the business sector or communities is implied (Campusano and Díaz, 2017; Fernández, 2017). It also promotes individual and autonomous learning, included in a work plan defined by objectives. In addition, it emphasizes the final product and skills (García y Basilotta, 2017; García y Pérez, 2018; Gracia, 2018; Granado *et al.*, 2020).

From this approach, the university teacher must possess the knowledge, didactic management and the daily information of the academic conditions of the students that allows the generation of significant knowledge through planning, listening, negotiating, evaluating, proposing innovations and developing behaviors in a real situation (Cobo and Valdivia, 2017; Mendoza, 2018). His gaze must be focused on the student: he must reflect and evaluate the aspects of his psychosocial, pedagogical, didactic and social educational practice in favor of inclusive approaches, as well as place the student in a renovating, civic, democratic, search, of creation, of active and critical people (Remacha and Belletich, 2015; Rodríguez, 2009). Here the pedagogical task must be managed and the integration of the subject in the context must be defined in order to promote the project in a systematic way and give it periodic feedback, as well as standardize the evaluation criteria (Rico, Garay & Ruiz, 2018) .

In universities, the generation of knowledge must be accompanied by research and practice for the development of competencies, with a design outside the university walls (Zamarripa, Martínez and Juárez, 2016). Thus, students are critical and achieve an intervention with the outside, apply will and react to real elements; Also, of course, there is the promotion of group skills and their interrelation, always with the advice and monitoring of teachers, who are guides in aspects such as autonomy, use content for a real practice, develop cooperative work similar to work and consider the encounter with responsibility (Fernández, 2017; Imaz, 2015; Medina and Tapia, 2017).

Projects of this type must be documented and throughout their implementation maintain a methodological, scientific and social attitude, the formation of behavior, respect, ethics, solidarity, be sustainable, commitment must be integrated. By doing this, education opens up to the world through its active application and forges students with social arguments (Botella and Ramos, 2019; Márquez and Jiménez, 2014; Torrego and Martínez, 2018). Aznar, Pujol, Sempere and Rizo (2012). Suárez and Gutiérrez (2014), express that social content, community service experience, ecological awareness, interdisciplinary application, development of inquiry, interaction, quality of results, self-esteem, are elements that promote added value as a self-training method for comprehensive development.

In this line, Guerrero and Calero (2013), as well as Toledo and Sánchez (2018), comment that the ABPr is a strategy that plans, implements and evaluates projects in the real world by considering the environment as a temporary learning unit, by There is important interaction between teachers and students, by facilitating communication, collaborative

work, invigorating leadership, creating critical and self-critical capacity. It is about training the person in such a way that they provide quality, conclude jobs, stimulate the work community, in addition to increasing knowledge. It is also about promoting university extension, taking advantage of the active human resources of companies, the application of science with methodologies and methods that contribute to substantial changes in the ways of learning, producing, transforming and marketing.

With the above, this work aims to determine if the ABPr is indeed a strategy that, accompanied by didactic planning that takes into account key actors and execution times, constitutes an impact alternative to educational practice capable of motivating the student in his professional life, the teacher in the student's training and the employer in his business environment.

General objective

The objective of the present investigation was to evaluate if ABPr as a strategy influences the development of competences of university students with professional apprenticeships in real contexts of their professional training.

Methodology

The competency-based learning approach enhances the ABPr and places on the table conditions such as the application of knowledge in a space beyond the classroom, which allows students to achieve contact with the reality of their profession, as well as stimulates critical thinking and creative (Flores and Juárez, 2017). This research considers the application of the ABPr strategy, which was carried out in two school cycles, January-April 2018 and January-April 2019, specifically in the subject of Financial Administration in the eighth semester in the engineering career in Development of Business of the Technological University of Usumacinta (UTU), Tabasco, Mexico. This career is based on the competency model (70% practical and 30% theoretical). Two groups of the same subject were considered in each cycle: 2018 (48 students) and 2019 (51 students) (table 1). According to the subject sheet approved in the study plan, the student must acquire the competence to carry out diagnoses, through analysis, projection and generation of strategies for organizations and determine the financial situation of companies through an analysis and projection, and

propose financial strategies (Coordinación General de Universidades Tecnológicas [CGUT], 2009).

Tabla 1. Datos generales de la población

Variables	Enero-abril 2018	Enero-abril 2019
Población estudiantil	48	51
Mujeres %	62.50	62.75
Hombres %	37.50	37.25
Experiencia laboral %		
Sí	79.17	60.78
No	20.83	39.22
Edad (Ẋ, población)	21.20	20.73

Fuente: Elaboración propia

Developing professional skills at the university level requires linking real-world situations, proposing projects and didactic strategies of a reflective nature that represent an intellectual challenge or challenge for those involved. To assimilate the competences that are required in the discipline is the purpose of the subject. This allowed the application of the ABPr, a method that addresses skills, knowledge and expected learning (Valdez and Machorro, 2014). This cluster can be developed in five steps that correspond to the processes required for the training of competencies (figure 1). Throughout this process, resources, evidence, products and performance indicators are used that comprehensively prepare the university student (Canquiz and Maldonado, 2016).

Flores and Juárez (2017) describe the ABPr based on five application stages, which allow a work arrangement from the general to the particular, and recommend that the teacher and the student consider the financial aspects of microenterprises, referred to in In this case, for the purposes of the Unit of Competence in Financial Administration (CGUT, 2009), as well as for micro-enterprises in the rural population of the region, which is where there is interference and attention is required due to the lack of specialist advice , without losing sight of the project objective, its scope, goals, procedures and its presentation (Fernández, 2017; Rodríguez y Cortés, 2010).

Figura 1. Procesos de aplicación del ABPr

Fuente: Elaboración propia con base en Flores y Juárez (2017)

For the conformity analysis, the instrument applied at the beginning and end of the course was developed according to the documentary review (Fernández, 2017), although some modifications were integrated according to the context of the research. The Cronbach's alpha test was considered, which resulted in indices greater than 0.8. This allows us to consider that there is content validity in the responses presented in the 12 items (Table 2). A Likert scale was used for understanding and evaluation with four options: “Excellent”, “Good”, “Regular” and “I don't know”, following the proposal of González and Castro (2011) and Malave (2007), who, by the way, they underline the relevance of applying the ABPr in the academic field.

Tabla 2. Ítems aplicados en diagnóstico y final de curso

Ítem	Pregunta
1	¿Sabes los conceptos generales de la materia d Administración Financiera?
2	¿Tienes conocimiento del manejo financiero de las empresas?
3	¿Tienes conocimiento de trabajar por proyectos?
4	¿Trabajas de forma colaborativa para resolver problemas?
5	¿Cambiarías la forma tradicional de aprender?
6	¿Te das cuenta de la importancia de hacer diagnósticos a la empresa?
7	¿Qué importancia tiene pata ti tomas decisiones para el desarrollo de la empresa?
8	¿Cómo es tu concepción de atención a la empresa?
9	¿Trabajar por proyectos es eficiente para tu aprendizaje?
10	¿Cómo sientes tu relación profesional con las empresas?
11	¿Cómo estimas el método de aprender por proyectos?
12	¿Se tiene un ambiente propicio para atender a las empresas?

Fuente: Elaboración propia con base en Fernández (2017)

In the case of the student, a performance self-evaluation is generated. The evaluation of the teacher and the employer is also considered (table 3). The instrument determined, through Cronbach's alpha, the correlation coefficient of the applied survey, and the t test for significance, if there is a difference in the results of the variables of the competence unit. The statistical program SPSS Statistics 2015 and Excel 2016 were used.

Tabla 3. Evaluación de la estrategia por el alumno

Ítem	Preguntas de evaluación
Autoevaluación del estudiante	
1	Evalúa tu desempeño en la realización del proyecto.
Evaluación de docente	
1	¿El asesor académico respeta las fechas programadas para brindar las asesorías?
2	¿Las asesorías proporcionadas por el asesor académico son adecuadas?
3	¿El asesor académico dispone de tiempo y espacio para las asesorías?
Evaluación del empresario	
1	¿Obtuviste las facilidades necesarias en la empresa para desarrollar tu plan de trabajo?
2	¿La empresa solucionó tus dudas?
3	¿El medio ambiente fue propicio para el aprendizaje?
4	¿Tuviste un trato respetuoso por parte de la empresa?
5	¿La empresa respetó el calendario de trabajo aprobado por el asesor académico?

Fuente: Elaboración propia

For the application of the ABPr, described by Márquez and Jiménez (2014), first the selection of the subject of the analytical program of the subject of Financial Administration was developed, which was covered in three units in a period of 15 weeks and 75 total hours, in two academic groups per cycle of care. For this, it was established as a deliverable to present a project aimed at proposing alternatives for a local microenterprise.

21 companies of the 2018 cycle and 12 of the 2019 cycle were randomly selected, through an intentional non-probabilistic sample (Ruiz, 2017), based on the list of companies reported by the H. Municipal Council of Emiliano Zapata Tabasco (Heroico Ayuntamiento Constitucional de Emiliano Zapata Tabasco, 2017), which presented turn of the agricultural sector, transformation and services (table 4). The difference in intervention was due to political problems in the region.

Tabla 4. Sectores y empresas atendidas por ciclo académico

Sector/Ciclo académico	Enero-abril 2018	Enero-abril 2019
Primario	2.00	-
Transformación	1.00	1.00
Servicios	18.00	11.00
Comida rápida	7.00	2.00
Ropa y accesorios	2.00	1.00
Farmacias	2.00	-
Abarrotes y perecederos	1.00	2.00
Papelería	2.00	1.00
Otros	4.00	5.00
Empresas	21.00	12.00

Fuente: Elaboración propia

After this, in both cycles the students were given the evaluation rubric, which included the criteria and scales. Participating students related to the company and presented the intervention project. It was formalized by visiting the teacher. To apply the activities and to obtain data on the history of the company, form of organization, financial statements for two years ago and part of the current year, which include assets, liabilities, sales, costs, market segments served and internal problems and externalities that affect them, the students conducted the interview with the employer in a structured way. The Office 2013 package was used for the development of simulations and specific reports.

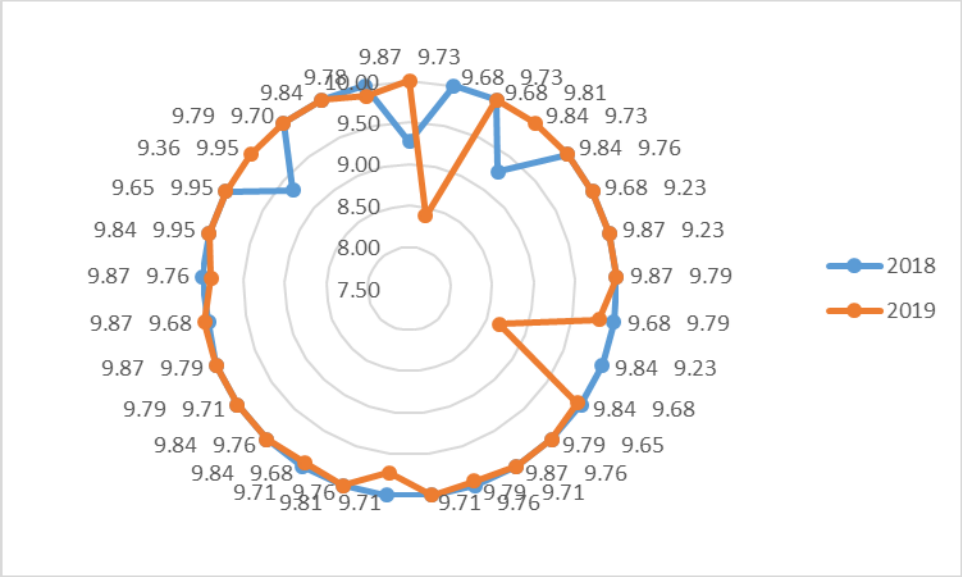
Results

With the parameters defined in the rubrics given to the students, the diagnosis of the company, analysis of the information and solution proposals were developed by the students. The projects and their report were built to complement the theoretical bases studied in the classroom that allowed to define the characteristics of the business. This is to make proposals for the attention of companies and prepare for a formal exhibition that would allow them to present their results to entrepreneurs.

Regarding the group level qualification for the 2018 cycle, with 21 projects, the first academic group, A, obtained an average qualification of the unit of competence of 9.78 and

the second, B, of 9.56. In the 2019 cycle, 12 projects were presented: the academic group A obtained an average qualification of the unit of competence of 9.92 and the B of 9.74, which gave both groups the qualification of self-employed. At the individual level, the behavior was similar. In 2018, the two groups were autonomous and in 2019 only two students obtained a proficiency assessment (Figure 2).

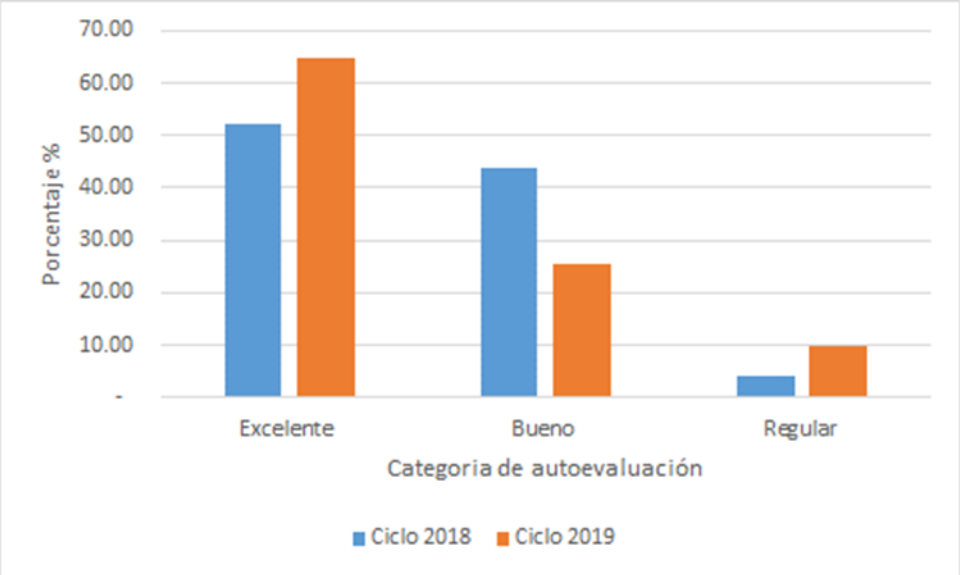
Figura 2. Evaluación de estudiantes a nivel individual



Fuente: Elaboración propia

In the self-evaluation, in the 2018 cycle 52.08% of the students rated their work as excellent, 43.57% rated their performance as good and 4.17% as fair; For 2019, 64.71% rated their work as excellent, 25.49% as good, and 9.8% as fair (figure 3).

Figura 3. Autoevaluación de estudiantes



Fuente: Elaboración propia

Regarding the responses to the questionnaire applied in 2018 at the beginning and end of the ABPr (figure 4), opinions changed over time. The perception of “I don't know” was minimized at the end of the work cycle. Once the documentary supports and collaborative work with the companies had been concluded and delivered, the responses of the application were placed in the options of "Good" and "Excellent"; and to a lesser extent, the perception “Regular” was located; some insights in "I don't know." This outlines the changes at the end of the projects, collaborative work, attention and knowledge of the exercise, for which the conditions for attention to the purposes and generation of competencies in this subject were reinforced, as well as the relationship with the reality that the strategy proposes for the training of students.

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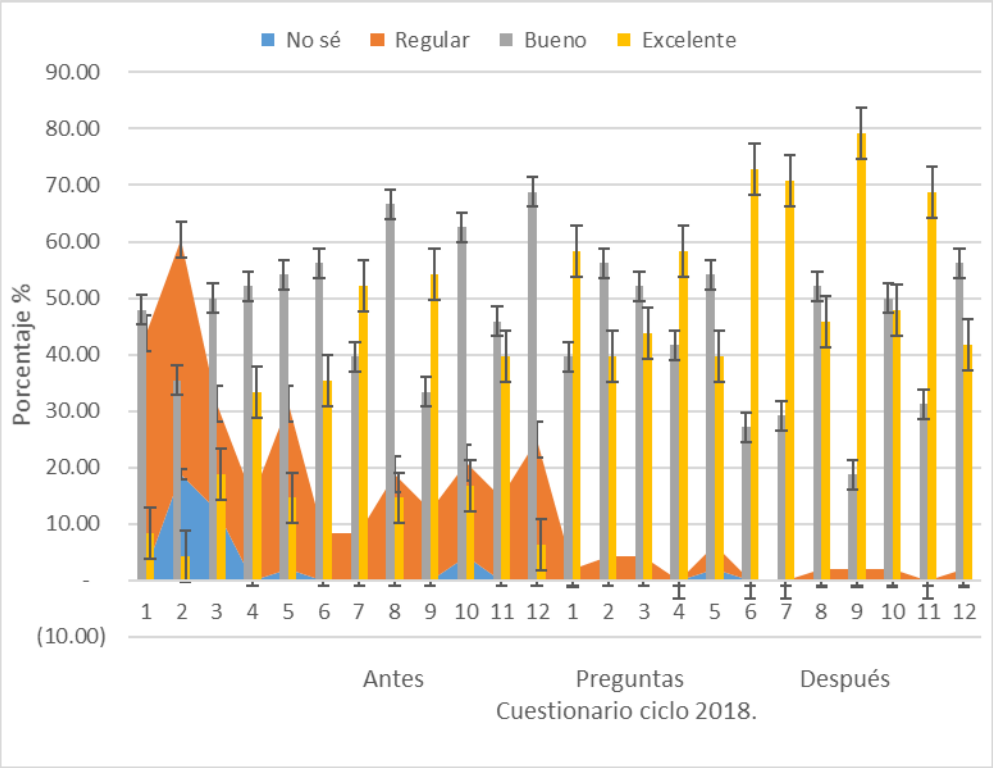
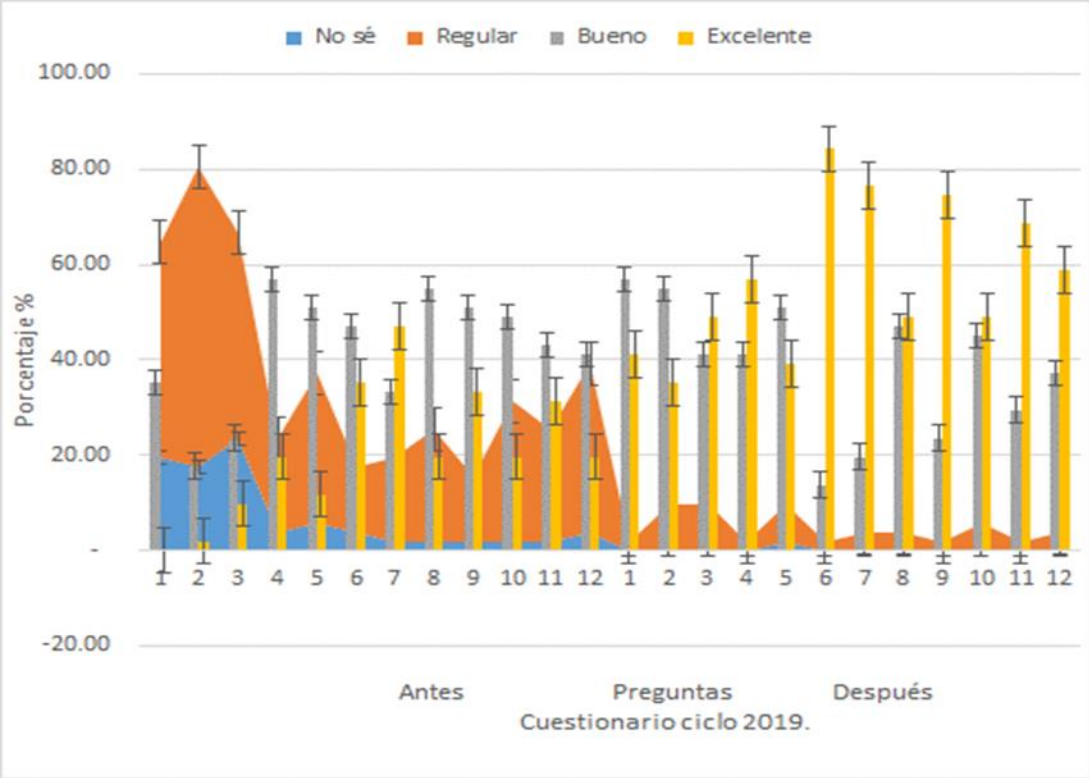
Figura 4. Opinión de estudiantes en la aplicación de ABPr en el ciclo 2018



Fuente: Elaboración propia

Of the 2019 cycle (figure 5), the option of "I don't know" appears as the predominant answer in the twelve questions asked in the moment before the application, however, at the end of the cycle there is a shift of opinion towards the option "Regular ", And in a higher proportion to" Good "and" Excellent ", with the exception of question five, which inquires about the traditional learning conditions compared to the one proposed here, where some think they prefer the traditional one, although it is 2% of the opinions, it is considered low with respect to the total of students.

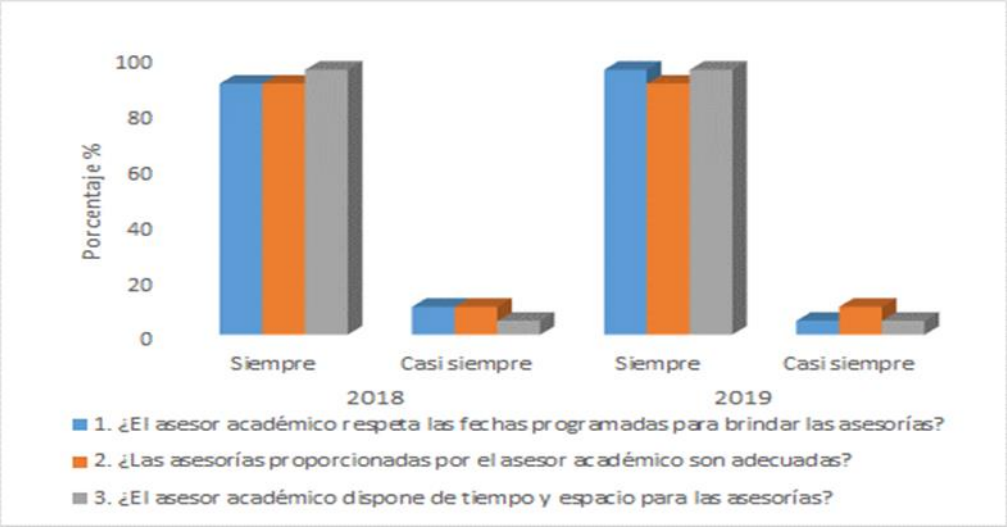
Figura 5. Opinión de estudiantes en la aplicación de ABPr en el ciclo 2019



Fuente: Elaboración propia

On the other hand, regarding the oral presentation, it is one of the closing elements of the ABPr, carried out in the presence of the entrepreneurs (table 5), in the 2018 cycle the students obtained an average of 87.29% of application or effectiveness; and with regard to the 2019 cycle, they obtained an average of 90.28%. Regarding the evaluation of the teacher, in both cycles 90% of effectiveness was obtained. Here were included the points of respecting the dates programmed in the strategy, time, space and availability in academic advising (figure 6).

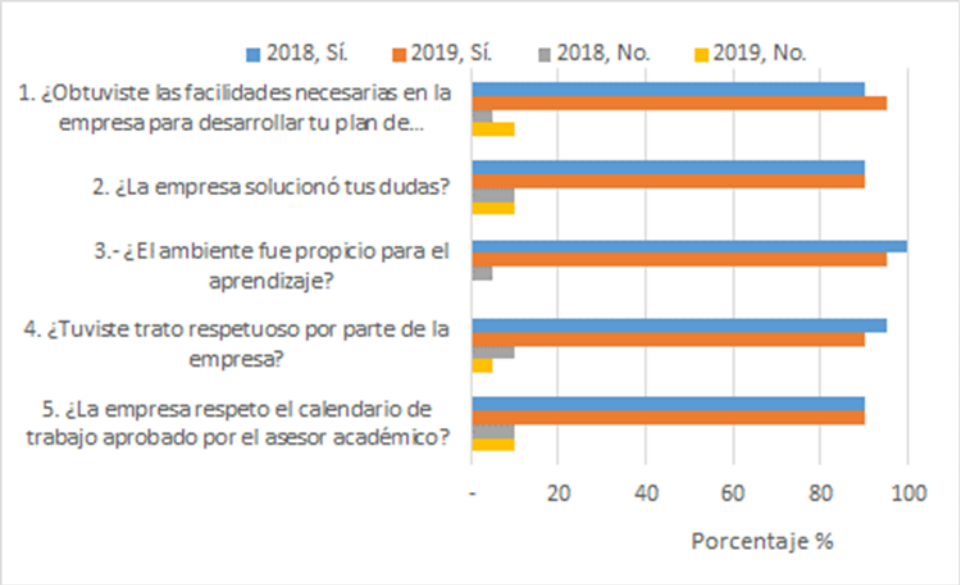
Figura 6. Evaluación del asesor académico



Fuente: Elaboración propia

The students also evaluated the company (figure 7). In both cycles there was relevant attention (92.5%), ease of developing the work plan, solution of doubts, respectful treatment and attention to the proposed activities.

Figura 7. Evaluación de la empresa por parte del estudiante



Fuente: Elaboración propia

At the same time, at the statistical test level, Cronbach's alpha was applied to obtain the level of consistency and reliability of the instrument. Thus, according to the opinions of the participants in both cycles, both consistency and reliability yielded values above 0.8

(Quero, 2010), which was calculated in the SPSS software. Based on the above, then, we can say that the processes in the 2018 and 2019 cycle are relevant (table 5), therefore, the applied instrument represents homogeneity of both items and the results of each instrument in the referenced cycles.

Tabla 5. Alfa de Cronbach en la aplicación

	2018		2019	
Pregunta	Inicio	Término	Inicio	Término
1	0.858	0.842	0.851	0.859
2	0.860	0.831	0.872	0.846
3	0.856	0.828	0.862	0.857
4	0.865	0.847	0.848	0.860
5	0.858	0.851	0.853	0.874
6	0.857	0.847	0.833	0.853
7	0.853	0.842	0.832	0.854
8	0.852	0.832	0.834	0.853
9	0.852	0.827	0.834	0.858
10	0.849	0.831	0.833	0.847
11	0.850	0.830	0.830	0.849
12	0.855	0.849	0.831	0.848
Instrumento	0.866	0.850	0.855	0.865

Fuente: Elaboración propia

The correlation, determination and significance coefficient was also applied (table 6). And it was estimated that in the 2018 cycle there was a correlation of 0.6675 and a determinant of 0.4456, which are classified as positive, medium and low, respectively. Here a significant value was found between the applications of $0.026 \leq 0.05$. For the 2019 cycle, a correlation of 0.4818 and a determination of 0.2322, that is, low positives, which impacts the application of the instrument and its responses estimate differences in the input and output of the information (Martínez, Tuya, Martínez, Pérez and Cánovas 2009), coupled with the fact that there is no significance between the application of the questionnaire when $0.621 \leq 0.05$ was obtained, due to differences in the evaluation of the students.

Tabla 6. Coeficiente de correlación y determinación.

Periodo	Correlación	Estadio	Determinación	Prueba *t*
2018	0.6675	Media	0.4456	0.026*
2019	0.4818	Baja	0.2322	0.621

Fuente: Elaboración propia

In the evaluation, seven parameters were estimated that represent the competences that the students acquire: carry out diagnoses, analysis, projection and generation of strategies for organizations, determine the financial situation of the company through an analysis and projection. It is estimated that the objectives of the competence unit and the disciplinary efficiency represented by the products or application reports towards the productive sector were met (table 7).

Tabla 7. Evaluación a la eficiencia disciplinar.

Concepto	2018 (%)	2019 (%)
Diagnóstico de la empresa	90.00	95.00
Análisis de necesidades	90.00	92.00
Estrategias financieras	93.00	92.00
Estrategias de apalancamiento	80.00	85.00
Análisis del entorno económico	86.00	88.00
Recomendaciones financieras	80.00	86.00
Estrategias y líneas de acción	92.00	94.00
Promedio	87.29	90.29

Fuente: Elaboración propia.

Discussion

The ABPr methodology motivates students to cover the performance and theoretical aspects, as well as to complete their work by means of a rubric. The 21 teams formed in the first cycle and the 12 in the second obtained the evaluation of autonomous learning, which is in line with the opinion of Barrios, García and Matuk (2010), Flores and Juárez, (2017) and Trujillo (2012), who comment that the ABPr contributes effectively to the development of competencies and curricular content. For their part, Torrego and Martínez (2018) consider

that the student rejects routine, monotony and pursues a democratic perspective. Accordingly, the students organize themselves into groups, develop projects based on real situations and become aware of their self-esteem.

Another relevant aspect is the data of the twelve items applied at the beginning and end of the course, with Cronbach's alpha> 0.8, correlation coefficient and standard error, which represent differences in opinions, although with a tendency to be good and excellent, which that suggests an acceptable change in the ways of applying knowledge to real environments and understanding how a company works. An interesting fact (referred to figures 2 and 3) is that the student appropriates and perceives the traditional method as a substitutable strategy for dynamic elements that support cooperative work, the connection of the curricular contents with reality, the participation of the community educational, as well as the active and critical application in learning (León, Martínez and Santos, 2018). This result impacts and transforms the role of those involved; invites to evaluate the aspects of educational practice in favor of approaches to a school-reality (Barba, Sonlleva y García, 2018).

When analyzing the results of the items regarding the application of the ABPr model, the students consider excellence in seven items (1, 4, 6, 7, 9, 11 and 12); The items that represent opinions between the range of good and excellent are 2, 3, 5, 8 and 10. The above agrees with what Maldonado (2008) comments, which is the potential to bring the student closer to the world, generate trust, creativity and above all stimulate academic training (average of 94% acceptance), which allows defining the usefulness in professional financial management and attention to the productive sector, knowledge of working on projects, responding to needs, by including global and cross-cutting strategies with productivity aspects to integrate professionals into companies (KPMG in Mexico, 2018), especially the possibility of establishing dynamic links with a long-term vision to contribute to sustainability, educate and organize society (Martínez and Juárez, 2019). Undoubtedly, this is in line with the 70% practical and 30% theoretical model of technological universities in Mexico.

The strategy allows responding to needs with motivation as an active element in the generation of knowledge, considering new and innovative experiences to adapt to a dynamic environment that enriches the formation of values (referring to questions four, five and six of working in a collaborative, understand the importance of promoting actions and changing

their way of thinking), as an active element (Aranda and Monleón, 2016). The contexts demand and it is a virtue to respond with their own methodologies that promote intervention and solution to real problems, especially social projects that trigger coexistence and sustainability (Tobón, 2017). This considers that its application requires knowing the curriculum and the student's interest to guarantee a serious, rigorous, systematic work and promote perseverance, dedication and effort in the actors (Aragón, Martínez and San Román, 2018).

However, students learn not only in isolation, but also by relating theory and practice. The processes of appropriation of knowledge are relevant and suggest reinforcing know-how and do. In this regard, as a reference of the total of students, 76% have already worked in companies at a formal level, and the opinion of perception of change in the way of learning impacted on the ways of conceptualizing the contents to learn and provide elements in the development of professional goals, especially useful to apply in your career upon graduation (Rodríguez, Kolmos y Guerra, 2017).

Based on the methodology proposed for the development of the ABPr, the students were able to define the problem, establish objectives of a real situation in the business area; The entrepreneurs evaluated the performance of the students with an average for the two cycles of 88.79% for presenting the results of the projects and strategies to the companies for the intervention developed, with analysis, reflections, active synthesis, but, above all, generating proposals and alternatives applied to real situations by integrating knowledge acquired so far throughout their academic career (García and Basilotta, 2017; Gracia, 2018; López, 2018; Márquez and Jiménez, 2014). It is to establish the utility in the generation of knowledge towards the production sectors, promote trust, autonomy, responsibility and above all feedback of the actions, for the internal improvement, of ideas and reality in the products, which reflect a holistic perspective through student practice and collaboration (Zancul, Sousa & Cauchick, 2017, 12).

Present the projects, with the evaluation of entrepreneurs, the learnings provide clear and concise proposals to address the problems and solve specific points of the companies, such as sales monitoring, cost management, obtaining a supplier catalog, requesting the analyzes from the accountants. monthly (Saavedra and Saavedra, 2015), above all, plan annually perspectives on business development. The students, although they know their limitations, together with the evaluation of the companies, which turned out to be higher than

90%, demonstrate maturity, adapt methodologies, generate ideas, relate labor aspects, as well as promote a change in values and ethics. At the individual level, they are motivated, trust their knowledge and actions, a dynamic environment is generated, of acceptance and challenges are posed in real contexts for the achievement of competences in their graduation profiles (Astorga et al., 2015; Ausín, Abella, Delgado and Hortigüela, 2016).

The teacher must assume the leadership of facilitation, enrich the possible innovations and the construction of knowledge in the training discipline (Guo, Saab, Post and Admiraal, 2020; Habók and Nagy, 2016); motivate, promote skills, break paradigms, improve relationships in the classroom, as well as motivate other teachers in the application of knowledge towards social forms that affect planning and training (Basilotta, 2018). As a substantial complement, it is the use of information and communication technologies (ICT) for the development of materials, the search, information curation in an academic and social integrality, both in university education and in personal training, in order to model environments conducive to competition and the creation of new approaches, such as sustainability and quality of life in society (Martínez y Juárez, 2020; Pinos, 2015).

A requirement of the methodology is to explain it by the teacher and identify the problem to be solved by the students. Both must present responsibility, collaboration, commitment and interaction; Through a project, establish the follow-up according to the academic program and the intervention in the company (Almulla, 2020; Martí, Heydrich, Rojas and Hernández 2010). On the other hand, it is necessary to link the theoretical aspects that imply complying with the training of competencies, which, in this case, are of business application, with the classroom aspects and generate concrete actions for the development of capacities (Aristidou, 2020). Thus, contribute to obtaining clear data and promote efficient actions to avoid biases in the information, with a structured didactic planning, taking into account the key actors and execution times.

This involves preparing students for this environment and considering the relevant measurement tools for their assessment. It is to be critical by being obliged to present final products so that there is a feedback of knowledge, the opportunity to escalate to the virtual, derived from the fact that there is a natural relationship with reality (Abuhmaid, 2020; Santyasa, Rapa and Sara 2020) and acquire the competences in the elaboration of diagnoses, when determining the financial situation of the company, analysis, projection and generation of strategies for the organizations.

In this process, the teacher must plan the work, from the generation of objectives to the delivery of products that can be individual or collaborative, the reference material and the form of its evaluation in the administration, relevance, authenticity of the product, in response to the physical and social environment, it must be clear (Indrawan, Jalinus and Syahril, 2019). Likewise, to know or correctly diagnose the environment, workloads, care or advice, democracy in work groups, avoid uncertainty in evaluations, clear rubrics and develop the socialization of students (de la Torre, Rubia, Aparicio and Rodríguez, 2020), be responsible and take care of the relationship with companies because they are the subjects of support for the generation of competences, contribute to personal relationships to extend values to social life, especially define a quality professional.

In this research there is no conflict of interest with companies, institutions or groups that may be directly affected or benefited from the published results. The limitation for being a participatory research depends on the behavior and attitudes of the students and people involved in the approach.

Conclusions

The ABPr strategy promotes the comprehensive training of the student by considering learning about being, knowing how to do and doing in their training. The application of the methodology expressed an important relationship with the learning developed in the area of Financial Administration with the companies in the environment, whose representatives shared experiences for professional training in being, knowing and knowing how to do, typical of the programs of technological universities .

This approach contributed to achieving professional competences, the elaboration of diagnoses, analysis of the information in the market aspects, of financial resources and assets for the formulation of strategies in the solution of existing needs, which originates to interpret a reality towards elements of projection required by the rural environment, where it was applied, and confidence is created in students by developing activities in real environments typical of their professional career.

According to the evaluations presented, it is considered that the ABPr is an application alternative in the competency model at the university level. Teaching is student-centered, teachers engage in activities and entrepreneurs derive engagement actions, which, together, involves the actors in a dynamic, collaborative, responsible and innovative work.

Contributions to future lines of research

The ABPr is a holistic didactic strategy that is necessary for the cognitive development of students. Its application allows the development of production processes, marketing, organization, social collaboration, serving the vulnerable population, all of which allows a direct intervention of the academic process in everyday situations of companies and social groups.

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