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A NEW FIXED AND GROWTH MEASUREMENT SCALE: DEVELOPMENT AND VALIDATION

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Abstract. This paper describes the development of 33 scale reagents to assess people's fixed and growth mindset perceptions. The concept of fixed and growth mindset arises from the theory of Carol S. Dweck that has been discussed for years in various investigations in the school environment; however, a scale of measurement in adults, particularly in workers for productivity, has not yet been developed. A measurement scale with three sections was designed with 70 reagents of fixed, learning mentality, taking the intelligence measurement of Buchanan, and Kern (2017), Dweck, Chiu, and Hong (1995), Dweck et al. (1999), as the reference. In the study, 97 supervisors from the maquiladora industry of Reynosa Tamaulipas participated; surveys were applied to three groups of participants to carry out the factorial reduction analysis process to verify the level of significance and validation of reagents. As a result, 15 fixed mindsets were obtained and 18 questions of growth mindset, which corroborate the referred theories of the measurement of the two dimensions of fixed and growth mindset. The use of this scale can serve as a reference for future research in adults to demonstrate their competence in productivity.

Keywords: Measurement scale, fixed mindset and growth mindset

NUEVA ESCALA DE MEDICIÓN DE MENTALIDAD FIJA Y APRENDIENTE: DESARROLLO Y VALIDACIÓN

Resumen. Esta publicación describe el desarrollo de 33 reactivos de escala para evaluar las percepciones de mentalidad fija y aprendiente de las personas. El concepto de mentalidad fija y aprendiente surge de la teoría de Carol S. Dweck que ha sido discutida por años en diversas investigaciones en el ámbito escolar, sin embargo aún no se ha desarrollado una escala de medición en adultos particularmente en trabajadores para la productividad, se diseñó una escala de medición con tres secciones con 70 reactivos de mentalidad fija y aprendiente, tomando la referencia la medición de inteligencia de Buchanan y Kern (2017), Dweck, Chiu y Hong (1995) y Dweck et al. (1999). En el estudio participaron 97 supervisores de la industria maquiladora de Reynosa Tamaulipas, se aplicaron encuestas a tres grupos de participantes para realizar el proceso de análisis de reducción factorial para comprobar el nivel de significancia y validación de reactivos.

Como resultado se obtuvieron 15 reactivos de mentalidad fija y 18 reactivos de mentalidad aprendiente, los cuales corroboran las teorías referidas de la medición de las dos dimensiones de mentalidad fija y aprendiente. El uso de esta escala puede servir como referente para futuras investigaciones en adultos para demostrar su competencia en la productividad.

Palabras clave: Escala de medición, mentalidad fija, mentalidad aprendiente.

Introduction

In this paper an empirical measurement scale is developed to assess perceptions of fixed and learning mindsets. The concept of learning and fixed mindset arises from Carol S. Dweck's theory that has been discussed for years in several researches in the school environment; however, a measurement scale has not yet been developed for adults, particularly in industrial workers.

The performance of the human factor is a critical factor in measuring the success of the productivity of companies that want to maintain and develop their workers.

There are several mechanisms to verify if a person is efficient, through tests and methods to measure their results, generally efficiency metrics; however, it may be insufficient only to take into account the knowledge and skill of the person. It is also necessary to measure the attitude and the way to face the challenges and difficulties of the task and the way to overcome them or decline; consequently, to know if the person has a characteristic trait of his person, as the mentality that can favor the achievement of his personal performance. Therefore, it is necessary to have a reliable reference to determine the type of mentality, learner or fixed, which may mean that the person can have a predictable behavior to the challenge.

This study focuses on the development of the scale of measurement of the learner or fixed mindset to identify the characteristic features of the person, which allows to evaluate the judgment of a person to face a given situation in their performance.

The Objective of this study is to (1) describe the development of a measurement scale for fixed and learner mentality and (2) discuss the properties of the scale and its potential application. The procedure for constructing the scale is based on the assessments of intelligence and the type of fixed or learner mentality.

Mindset and Personal Change

The theory of mindedness, also known as the implicit self theory, Dweck, Chiu and Hong (1995), state that people's self-beliefs influence judgments and reactions, particularly in the face of negative events. The main contribution of their study refers to two different assumptions. On the one hand, based on entity theory, they define that people have a highly valued personal trait such as intelligence, it is a fixed trait that cannot be changed. On the other hand, based on the incremental theory, they define that people can change their intelligence and develop it by learning new things and become more intelligent through effort.

In another study, Dweck, et al. (1999) confirm that intelligence has a relative effect on the trait of the person assigned to fixed factors and contrary to malleable ones. This contrast depends on the way the person copes with challenges and determines the

way of achievement. In this study it is determined that people with fixed trait depend on their self-confidence and, in the face of failure, they are not willing to make an effort, while malleable people in the face of failure are willing to make an effort.

Theories of the self in personality development are of great contribution to the understanding of individual change. In this regard, based on his own intelligence, Dweck (2000) explains that the hallmark of an individual is that he or she loves to learn, envisions change from assessing his or her own strength and persistence in the face of obstacles.

In a study of students, Dweck (2000) explains that some students show a certain quality for change and others do not, according to the following assertions: (1) students showed more abilities when facing obstacles, (2) they show more energy when facing more changes in the test to succeed, (3) they feel more encouraged when others recognize their intelligence, (4) students are more confident in their own intelligence. Conviction is when students believe in their own abilities to thrive.

The choice of achievement is related to the value of the task. In the study of Eccles (2005) through his model of choice for achievement, he determines two important groupings of the beliefs of the individual. First, the importance of individual choices for success has explanation in personal efficacy confidence. Second, the importance of evaluating the task among different choices for achievement is explained by the individual's intelligence and estimation of the level of difficulty of the decision.

In Eccles' (2005) proposed model applied to students, to enroll in career choice courses resulted in the following constructs (1) the expectation for success and sense of achievement through personal efficacy in the face of different testing options, (2) the relationship of short and long term goal choices through the need for social acceptance, (3) the individual role by culture, gender, religion, and ethnic group, and (4) the potential and cost of time investment in the preference of an activity among others.

Following the idea that when people face a challenge they activate their intelligence, Gollwitzer (2012) states that cognitive procedures are activated when the person faces a complex task, they deliberately choose what information they need to analyze and process to activate their intelligence.

This study highlights the relationship of the person between motivation and will establishing that the theory of mind-set has a process of phases of action. It also refers that people construct their own self-concept by setting goals such as being a good parent, a good scientist, a good worker, and their taste for achievement. Regarding the will and self-esteem to determine their own identity or self-definition of goals, he determines it as the theory of self-determination. The main purpose of this theory is to demonstrate that when people face experiences of failure or barriers, they do not give up but rather intensify their efforts to reach their goal.

In the phased mindset type, Gollwitzer (2012) highlights that the task of choosing in preliminary phase before a decision is a way of choosing between several desires of the person and choosing those few desires that he/she wants to realize. However, the choice of information has to be provided with pros and cons, to carry weight in the choice, and to be open minded so that the challenge is a genuine attraction. In this way it can be deduced that the person activates his mentality in phases to select what he really wants to do and that means to reach a goal, this choice among several desires inside of him, the one that has more weight.

Expectations of the Fixed and Learner Mentality

In Dweck's (2000) study with students, he confirms that some people believe that intelligence is a fixed personal trait. This condition was referred to as the entity theory of intelligence. This theory explains that intelligence is a reflection of the person, that change is a result of self-efficacy, and that intelligence can be malleable. When people persist in cultivating their behavior through learning, intelligence is something that can be increased and manifests itself as a strength of the person.

Following this concept of intelligence is malleable Dweck (2000) in setting goals for achievement, two conditions are identified: First, performance is a goal, this is determined by having a positive judgment of what it means to win. In the test with students, the author finds that the goals are related to their intelligence, they want to feel intelligent in front of others. Second, learning is a goal, increasing one's competence reflects one's tool for learning, students want to be smart.

People develop their own ability to learn and improve their competence, Wood and Bandura (1989) explain in their research that people with this conception adopt learning as a goal. They seek challenging tasks that provide opportunities to expand their knowledge and competencies. Mistakes are considered natural and necessary in the process of acquisition.

In Wood and Bandura's study (1989), three aspects of people were evaluated: managerial self-efficacy, personal goals, and personal strategies for performance. They were able to confirm the proposed hypothesis of individual self-regulation through management mechanisms in decision making. When people are focused on the realization of work requirements, using goals, feedback, and rewards to achieve productivity gains, they necessarily demonstrate their competence. People's conceptions of capability when approaching complex tasks affect self-regulation to display their talent. Therefore, self-regulation is an indicator variable of people who face a complex task, modify their talent or intelligence to face it as a goal or personal strategy to overcome it.

In another study Buchanan and Kern (2017) explore the importance of mindset in shaping a future of greater possibilities. They explain that people's mindsets reflect attitudes, beliefs, and values that influence their ability to learn, lead, and contribute to their environment. The authors explain that a narrow focus is that people think about what they do (fixed mindset) and how they do it (learning mindset), rather than asking the broader question why they do something. This leads to individuals tending to repeat past patterns, rather than looking for and producing what might be different and meaningful in their environment.

According to Buchanan and Kern (2017), fixed and learner mindset are also related to the maturity and performance level of an achiever. The authors describe that generally achievers are more comfortable working in the system where they belong, they do not question the system itself, they behave with (fixed mindset), they mature at an individualistic level. However, the individualist who behaves with a (learning mindset) questions why they do what they do and if they find a purpose beyond what the goal is. They strive to learn. Then it could be the beginning of the individualist's shift from being a learner to becoming a leader in the system.

Method

Design of the measurement scale

The generation and construction of the instrument's reagents correspond to two categories of mentality: the fixed mentality and the learning mentality. To design the scale, we started with a total of 70 reagents for a first grouping of the questionnaire integrated into three sections. Below it is described how it was carried out:

The first section was designed based on the selection of 20 reagents taken from previous publications such as the measurement of intelligence (Buchanan and Kern, 2017; Dweck, Chiu and Hong, 1995; Dweck, et al., 1999) based on these English language reagents, a process of translation and adaptation for the environment of manufacturing supervisors was performed. In this way, each item was edited to obtain the best interpretation in Spanish in which the identification is achieved to question the intelligence and talent of the people.

Subsequently, they were integrated into the instrument in the first section in the numbering from 1-20 to identify each reagent, a coding column describing the type of reagent was added. The purpose of the coding is to control each reagent for the analysis process, as can be seen in figure 1.

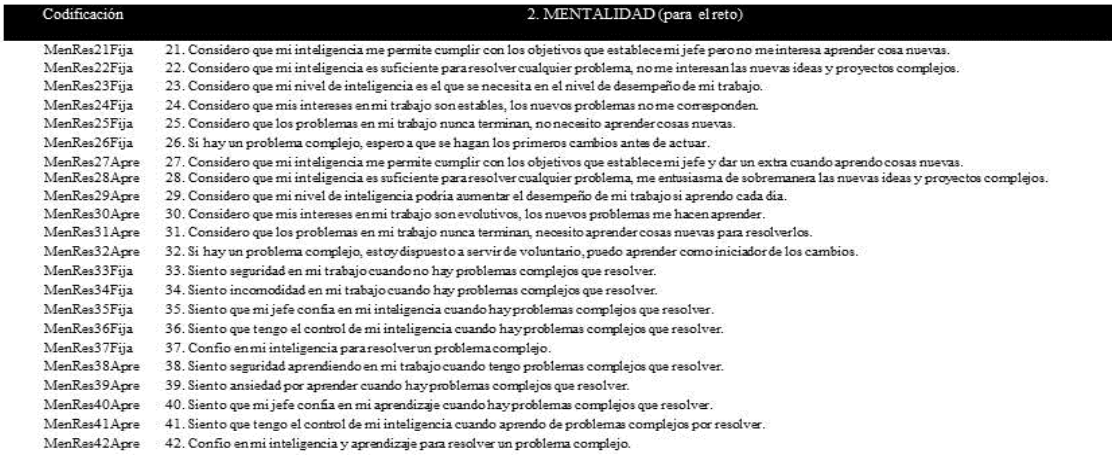
Codificación	1. MENTALIDAD (inteligencia/talento)
MenInte1Fija	1.Considero que tengo cierta cantidad de inteligencia y realmente no puedo hacer mucho por cambiarla.
MenInte2Fija	2.Considero que mi inteligencia es algo sobre mi que no puedo cambiar mucho.
MenInte3Fija	3.Considero que soy honesto, realmente no puedo cambiar mi nivel de inteligencia.
MenInte4Fija	4.Considero que puedo cambiar cosas nuevas, pero realmente no puedo cambiar mi inteligencia básica.
MenInte5Fija	5.Considero que la inteligencia que tengo, no ha cambiado desde que nací.
MenInte6Apre	6.Considero que sin importar como soy como soy, yo puedo cambiar significativamente mi nivel de inteligencia.
MenInte7Apre	7.Considero que puedo cambiar considerablemente la inteligencia que tengo.
MenInte8Apre	8.Considero que sin importar el nivel de inteligencia que tenga, siempre puedo incrementarla.
MenInte9Apre	9. Puedo cambiar incluso mi nivel básico de inteligencia considerablemente.
MenInte10Apre	10. Considero que la inteligencia que tengo, aumento con el aprendizaje y la edad.
MenInte11Fija	11. Considero que tengo cierta cantidad de talento y realmente no puedo hacer mucho por cambiarlo.
MenInte12Fija	12. Considero que mi talento es algo sobre mi que no puedo cambiar mucho.
MenInte13Fija	13. Considero que soy honesto, realmente no puedo cambiar mi nivel de talento.
MenInte14Fija	14. Considero que puedo cambiar cosas nuevas, pero realmente no puedo cambiar mi talento básico.
MenInte15Fija	15. Considero que el talento que tengo, es de nacimiento.
MenInte16Apre	16. Considero que sin importar como soy como soy, yo puedo cambiar significativamente mi nivel de talento.
MenInte17Apre	17. Considero que puedo cambiar considerablemente el talento que tengo.
MenInte18Apre	18. Considero que sin importar el nivel de talento que tenga, siempre puedo incrementarlo.
MenInte19Apre	19. Puedo cambiar incluso mi nivel básico de talento considerablemente.
MenInte20Apre	20. Considero que el talento que tengo, aumento con el aprendizaje y la edad.

Figure 1. Section 1 mindset instrument (Intelligence-talent). Measurement scale reagents from 1 to 20 coded for fixed mindset and learning mindset.

Note: Source: Own elaboration, 2021.

The second section was designed based on the selection of 10 reagents taken from previous publications such as the measurement of intelligence for the challenge (Dweck, Chiu and Hong, 1995; Dweck, et al., 1999; Dweck, 2000; Eccles, 2005); based on these English language items, a process of translation and adaptation for the environment of manufacturing supervisors was carried out. In this way, each item was edited to obtain the best interpretation of 22 reagents in the Spanish language in which the identification is achieved to question the intelligence for the people's challenge. Subsequently, they were integrated into the instrument in the second section in the 21-42 numbering to identify each item, a coding column was added that describes the type of item. The

purpose of the coding is to control each item for the analysis process, as can be seen in figure 2.



Codificación	2. MENTALIDAD (para el reto)
MenRes21Fija	21. Considero que mi inteligencia me permite cumplir con los objetivos que establece mi jefe pero no me interesa aprender cosa nuevas.
MenRes22Fija	22. Considero que mi inteligencia es suficiente para resolver cualquier problema, no me interesan las nuevas ideas y proyectos complejos.
MenRes23Fija	23. Considero que mi nivel de inteligencia es el que se necesita en el nivel de desempeño de mi trabajo.
MenRes24Fija	24. Considero que mis intereses en mi trabajo son estables, los nuevos problemas no me corresponden.
MenRes25Fija	25. Considero que los problemas en mi trabajo nunca terminan, no necesito aprender cosas nuevas.
MenRes26Fija	26. Si hay un problema complejo, espero a que se hagan los primeros cambios antes de actuar.
MenRes27Apre	27. Considero que mi inteligencia me permite cumplir con los objetivos que establece mi jefe y dar un extra cuando aprendo cosas nuevas.
MenRes28Apre	28. Considero que mi inteligencia es suficiente para resolver cualquier problema, me entusiasma de sobremanera las nuevas ideas y proyectos complejos.
MenRes29Apre	29. Considero que mi nivel de inteligencia podría aumentar el desempeño de mi trabajo si aprendo cada día.
MenRes30Apre	30. Considero que mis intereses en mi trabajo son evolutivos, los nuevos problemas me hacen aprender.
MenRes31Apre	31. Considero que los problemas en mi trabajo nunca terminan, necesito aprender cosas nuevas para resolverlos.
MenRes32Apre	32. Si hay un problema complejo, estoy dispuesto a servir de voluntario, puedo aprender como iniciador de los cambios.
MenRes33Fija	33. Siento seguridad en mi trabajo cuando no hay problemas complejos que resolver.
MenRes34Fija	34. Siento incomodidad en mi trabajo cuando hay problemas complejos que resolver.
MenRes35Fija	35. Siento que mi jefe confía en mi inteligencia cuando hay problemas complejos que resolver.
MenRes36Fija	36. Siento que tengo el control de mi inteligencia cuando hay problemas complejos que resolver.
MenRes37Fija	37. Confío en mi inteligencia para resolver un problema complejo.
MenRes38Apre	38. Siento seguridad aprendiendo en mi trabajo cuando tengo problemas complejos que resolver.
MenRes39Apre	39. Siento ansiedad por aprender cuando hay problemas complejos que resolver.
MenRes40Apre	40. Siento que mi jefe confía en mi aprendizaje cuando hay problemas complejos que resolver.
MenRes41Apre	41. Siento que tengo el control de mi inteligencia cuando aprendo de problemas complejos por resolver.
MenRes42Apre	42. Confío en mi inteligencia y aprendizaje para resolver un problema complejo.

Figure 2. Instrument section 2 mindset (for the challenge). Measurement scale reagents 21-42 coded for fixed mindset and learner mindset.

Note: Source: Own elaboration, 2021.

The third section was designed based on the selection of 10 reagents taken from previous publications such as the measurement of intelligence for self-efficacy of (Buchanan and Kern, 2017; Dweck, Chiu and Hong, 1995; Dweck, et al., 1999; Dweck, 2000; Gollwitzer, 2012; Wood and Bandura, 1989), based on these English language reagents, a process of translation and adaptation for the environment of manufacturing supervisors was performed. In this way, each item was edited to obtain the best interpretation of 28 reagents to the Spanish language in which the identification is achieved to question the intelligence for self-efficacy of people. Subsequently, they were integrated into the instrument in the third section in the numbering of 43-70 to identify each item, a coding column was added that describes the type of item. The purpose of the coding is to control each item for the analysis process, as can be seen in figure 3.

Codificación	3. MENTALIDAD (para la autoeficacia)
MenAut43Fija	43. Considero que las dificultades de mi trabajo son eventos que siempre puedo superar.
MenAut44Fija	44. Considero que las dificultades de mi trabajo, puedo resolver sin esfuerzo.
MenAut45Fija	45. Considero que tengo controladas las dificultades en mi trabajo.
MenAut46Fija	46. Considero que he estado obsesionado con una determinada idea o proyecto durante un tiempo corto, pero luego pierdo interés para continuar.
MenAut47Fija	47. Considero que no soy muy persistente en mi trabajo.
MenAut48Fija	48. Considero que no necesito esforzarme en proyectos que tardan más de unos meses en completarse.
MenAut49Fija	49. Considero que soy eficaz cuando termino cualquier proyecto que empiezo.
MenAut50Fija	50. Considero que soy eficaz cuando se trata de persuadir a las personas, para que comprendan mi punto de vista o que hagan lo que yo deseo.
MenAut51Fija	51. Al terminar mi día de trabajo, me siento satisfecho de lo que he realizado.
MenAut52Apre	52. Considero que he superado las dificultades en mi trabajo para conquistar con inteligencia un desafío importante.
MenAut53Apre	53. Considero que enfrentar las dificultades en mi trabajo, alientan mi inteligencia.
MenAut54Apre	54. Considero que para controlar las dificultades en mi trabajo., necesito ser más inteligente.
MenAut55Apre	55. Considero que he estado obsesionado con una determinada idea o proyecto durante un tiempo corto, pero luego me intereso en ser más inteligente para continuar.
MenAut56Apre	56. Considero que soy muy persistente en mi trabajo.
MenAut57Apre	57. Considero que necesito esforzarme y aprender de proyectos que tardan más de unos meses en completarse.
MenAut58Apre	58. Considero que soy eficaz cuando me esfuerzo y aprendo para terminar cualquier proyecto que empiezo.
MenAut59Apre	59. Considero que soy eficaz cuando aprendo y con inteligencia trato de persuadir a las personas, para que comprendan mi punto de vista o que hagan lo que yo deseo.
MenAut60Apre	60. Al terminar mi día de trabajo, me siento satisfecho si aprendí algo nuevo de lo que he realizado.
MenAut61Fija	61. Confío en mi inteligencia pero no estoy muy a gusto con cambios en mi trabajo.
MenAut62Fija	62. Confío en mi inteligencia pero siento que no soy respetado por mi trabajo
MenAut63Fija	63. Confío en obtener buen resultado en las pruebas fáciles.
MenAut64Fija	64. Confío en mi inteligencia pero no soy el indicado para resolver una dificultad de trabajo.
MenAut65Fija	65. Confío en mi inteligencia pero me disgustan las nuevas exigencias.
MenAut66Apre	66. Confío en mi inteligencia me ayuda a sentirme a gusto en mi trabajo aún de que existan cambios.
MenAut67Apre	67. Confío en mi inteligencia me ayuda a ganar respeto por mi trabajo.
MenAut68Apre	68. Confío en obtener buen resultado en las pruebas aún en las difíciles.
MenAut69Apre	69. Confío en mi inteligencia me ayuda a comprender y resolver una dificultad de trabajo.
MenAut70Apre	70. Confío en mi inteligencia me ayuda a comprender y enfrentar las nuevas exigencias.

Figure 3. Instrument section 3 mindset (for self-efficacy). Measurement scale reagents from 43 to 70 coded for fixed mindset and learner mindset.

Note: Source: Own elaboration, 2021.

The participants of the measurement scale.

The target population for the study (production supervisors) were chosen through a non-probability procedure, a convenience sample of 97 participants from a list of contacts from 5 maquiladora industrial parks of the industrial sectors (Automotive, Aerospace, Agro-industrial, Chemical, Plastic, Medical, Packaging, Metal-mechanical, Electrical-Electronic) of the City of Reynosa Tamps. For the collection of the information, electronic surveys were applied, sent by e-mail due to the restrictions of the current pandemic.

The first data collection for processing and analysis, an instrument with 70 reagents was applied to a group of 30 participants. The second data collection for analysis and refinement, an instrument with 33 reagents was applied to a group of 36 participants. The third data collection for analysis and refinement, an instrument with 33 reagents was applied to a group of 31 participants.

The instrument of the measuring scale.

The instrument is composed of cover page, introduction, general purpose of the study, instructions inserted throughout the same, contains three sections. A section with 20 reagents to identify the factors of fixed and learning mindset (intelligence/talent). Another section with 22 reagents to identify the fixed and learning mindset factors (challenge mindset). A final section with 28 reagents to identify the fixed and learning mindset factors (self-efficacy mindset). At the end of the questionnaire, a thank you to the participants was added. The questionnaire was administered by email to each participant.

Analysis of the measurement scale data.

The data of the initial instrument with 70 reagents were statistically analyzed to find similarities until the reduction of 33 reagents that determined the validity and reliability of the constructs of mindset (learner and fixed) was achieved through the following process.

First data collection, an instrument with 70 reagents was applied to a group of 30 participants. Using the method of extraction of the main factors and reliability assessment (Cronbach's alpha), the following results were obtained.

The first principal component (table 1.1) explained 80.498% of variance and was composed of fixed mindset reagents from the intelligence and talent section (eight reagents), challenge section (five reagents), self-efficacy (two reagents). The second principal component (table 1.2) explained 77.362% of variance and was composed of learning mindset reagents from the intelligence and talent section (six reagents), challenge section (four reagents), self-efficacy (seven reagents).

Table 1
Fixed mindset factor extraction of the sections: intelligence and talent, challenge and self-efficacy, 30 participants.

Reagents	Factorial extraction
MenInte 1 Fixed	.670
MenInte 2 Fixed	.766
MenInte 3 Fixed	.899
MenInte 4 Fixed	.829
MenInte 5 Fixed	.671
MenInte 12 Fixed	.896
MenInte 13 Fixed	.921
MenInte 14 Fixed	.904
MenRes 21 Fixed	.840
MenRes 22 Fixed	.785
MenRes 25 Fixed	.841
MenRes 35 Fixed	.691
MenRes 36 Fixed	.824
MenAut 43 Fixed	.800
MenAut 63 Fixed	.738

Note: Rotated factor loadings for the first fixed mindset principal component showing fifteen constituent reagents and the strength of their relationship.

Table 2
Factorial extraction of intelligence learning mindset sections: intelligence and talent, challenge and self-efficacy, 30 participants.

Reagents	Factorial extraction
MenInte 6 Apre	.725
MenInte 8 Apre	.922
MenInte 9 Apre	.874
MenInte 10 Apre	.869
MenInte 16 Apre	.869
MenInte 18 Apre	.898
MenRes 30 Apre	.824
MenRes 32 Apre	.858
MenRes 38 Apre	.762
MenRes 42 Apre	.845
MenAut 52 Apre	.784
MenAu t53 Apre	.649
MenAut 55 Apre	.910
MenAut 57 Apre	.559
MenAut 60 Apre	.531
MenAut 67 Apre	.622
MenAut 68 Apre	.675
MenAut 69 Apre	.748

Note: Rotated factor loadings for the first learner mindset principal component showing eighteen constituent reagents and the strength of their relationship.

Second data collection, an instrument with 33 reagents was applied to a group of 36 participants. Using the method of extraction of the main factors and reliability assessment (Cronbach's alpha), the following results were obtained.

The first principal component (Table 2.1) explained 77.06% of variance and was composed of fixed mindset reagents from the intelligence and talent section (eight reagents), challenge section (five reagents), self-efficacy (two reagents). The second principal component (Table 2.2) explained 77.362% of variance and was composed of learning mindset reagents from the intelligence and talent section (six reagents), challenge section (four reagents), self-efficacy (eight reagents).

Table 3
Fixed mindset factor extraction of the sections: intelligence and talent, challenge and self-efficacy, 36 participants.

Reagents	Factorial extraction
MenInte 1 Fixed	.654
MenInte 2 Fixed	.802
MenInte 3 Fixed	.854
MenInte 4 Fixed	.645
MenInte 5 Fixed	.817
MenInte 12 Fixed	.754
MenInte 13 Fixed	.815
MenInte 14 Fixed	.778
MenRes 21 Fixed	.782
MenRes 22 Fixed	.740
MenRes 25 Fixed	.695
MenRes 35 Fixed	.852
MenRes 36 Fixed	.776
MenAut 43 Fixed	.839
MenAut 63 Fixed	.757

Note: Rotated factor loadings for the first fixed mindset principal component showing fifteen constituent reagents and the strength of their relationship.

Table 4
Factorial extraction of intelligence learning mindset sections: intelligence and talent, challenge and self-efficacy.

Reagents	Factorial extraction
MenInte 6 Apre	.919
MenInte 8 Apre	.915
MenInte 9 Apre	.765
MenInte 10 Apre	.815
MenInte 16 Apre	.838
MenInte 18 Apre	.828
MenRes 30 Apre	.802
MenRes 32 Apre	.765
MenRes 38 Apre	.795
MenRes 42 Apre	.874
MenAut 52 Apre	.646
MenAut 53 Apre	.882
MenAut 55 Apre	.680
MenAut 57 Apre	.848
MenAut 60 Apre	.816
MenAut 67 Apre	.678
MenAut 68 Apre	.773
MenAut 69 Apre	.727

Note: Rotated factor loadings for the first learner mindset principal component showing eighteen constituent reagents and the strength of their relationship.

Third data collection, an instrument with 33 reagents was applied to a group of 30 participants. Using the method of extraction of the main factors and reliability assessment (Cronbach's alpha) the following results were obtained.

The first principal component (Table 3.1) explained 77.06% of variance and was composed of fixed mindset reagents from the intelligence and talent section (eight reagents), challenge section (five reagents), self-efficacy (two reagents). The second principal component (Table 3.2) explained 79.82% of variance and was composed of learning mindset reagents from the intelligence and talent section (six reagents), challenge section (four reagents), self-efficacy (eight reagents).

Table 5
Factor extraction of fixed mindset from the sections: intelligence and talent, challenge and self-efficacy.

Reagents	Factorial extraction
MenInte 1 Fixed	.654
MenInte 2 Fixed	.802
MenInte 3 Fixed	.854
MenInte 4 Fixed	.645
MenInte 5 Fixed	.817
MenInte 12 Fixed	.754
MenInte 13 Fixed	.815
MenInte 14 Fixed	.778
MenRes 21 Fixed	.782
MenRes 22 Fixed	.740
MenRes 25 Fixed	.695
MenRes 35 Fixed	.852
MenRes 36 Fixed	.776
MenAut 43 Fixed	.839
MenAut 63 Fixed	.757

Note: Rotated factor loadings for the first fixed mindset principal component showing fifteen constituent reagents and the strength of their relationship.

Table 6
Factorial extraction of intelligence learning mindset sections: intelligence and talent, challenge and self-efficacy.

Reagents	Factorial extraction
MenInte 6 Apre	.919
MenInte 8 Apre	.915
MenInte 9 Apre	.765
MenInte 10 Apre	.815
MenInte 16 Apre	.838
MenInte 18 Apre	.828
MenRes 30 Apre	.802
MenRes 32 Apre	.765
MenRes 38 Apre	.795
MenRes 42 Apre	.874
MenAut 52 Apre	.646
MenAut 53 Apre	.882
MenAut 55 Apre	.680
MenAut 57 Apre	.848
MenAut 60 Apre	.816
MenAut 67 Apre	.678
MenAut 68 Apre	.773
MenAut 69 Apre	.727

Note: Rotated factor loadings for the first learner mindset principal component showing eighteen constituent reagents and the strength of their relationship.

Results

The questionnaires applied to the selected groups were experimentally confirmed, through factor analysis and reliability studies (Cronbach's alpha), to assess their validity and confidence. Each item was measured repeatedly until the construct was confirmed.

Downscaling

The initial instrument of 70 reagents was grouped for analysis of the result of three sections, one with 20 reagents to identify the factors of fixed and learner mindset (intelligence/talent). Another section with 22 reagents to identify the fixed and learner mindset factors (challenge mindset), and a final section with 28 reagents to identify the fixed and learner mindset factors (self-efficacy mindset). These groupings were deliberately appropriate to meet the objective of developing a reliable and meaningful

fixed and learner mindset measurement scale to assess a person's judgment in coping with a given situation in their performance for productivity.

Purification of the scale, first collection

The purification of the instrument was done by computer analysis with the SPSS program, the data were run to obtain the extraction of 15 fixed mindset reagents with an analysis of variance of 80.498, with a coefficient (Cronbach's alpha) of .784 loaded on 4 dimensions (constructs) and the extraction of 18 learning mindset reagents with an analysis of variance of 77, with a coefficient (Cronbach's alpha) of .913 loaded on 5 dimensions (constructs).

Purification of the scale, second collection

The purification of the instrument was done by computer analysis with the SPSS program, the data were run to obtain the extraction of 15 fixed mindset reagents with an analysis of variance of 77.06, with a coefficient (Cronbach's alpha) of .756 loaded on 5 dimensions (constructs) and the extraction of 18 learning mindset reagents with an analysis of variance of 79.82, with a coefficient (Cronbach's alpha) of .824 loaded on 6 dimensions (constructs).

Purification of the scale, third collection

The purification of the instrument was done by computer analysis with SPSS program, the data were run to obtain the extraction of 15 fixed mindset reagents with an analysis of variance of 74.72, with a coefficient (Cronbach's alpha) of .811 loaded on 4 dimensions (constructs) and the extraction of 18 learner mindset reagents with an analysis of variance of 73.75, with a coefficient (Cronbach's alpha) of .835 loaded on 4 dimensions (constructs).

Discussion and conclusions

The study conducted provides empirical information, the properties of a scale to measure the type of mindset: fixed mindset and learning mindset based on Carol S. Dweck's mindset theory, which has been discussed for years.

The study was conducted in the maquiladora industry of the industrial sectors (Automotive, Aerospace, Agro-industrial, Chemical, Plastic, Medical, Packaging, Metal-mechanical, Electrical-Electronic) of the City of Reynosa Tamps. These industries are representative, to measure the performance behavior of production supervisors under the context of production operation.

In relation to the theories of mindset and personal change, several studies (Dweck, Chiu and Hong 1995; Dweck, et al., 1999; Dweck 2000; Eccles, 2005; Gollwitzer, 2012) corroborate the way in which people face their own beliefs, studies such as Dweck, Chiu, and Hong's (1995) entity theory, show that people influence judgments and reactions to negative events, people have a highly valued personal trait such as intelligence, a fixed trait that cannot be changed. Also in reference to the incremental theory, they define that people can change their intelligence and develop it through learning and effort.

Following this basis of intelligence in the study of Dweck, et al. (1999), they confirm that people with fixed trait depend on their self-confidence and in the face of failure are not willing to make an effort. However, considering that people can change, Dweck's (2000) study confirms that the individual projects their change by assessing their own

strength and persistence in the face of obstacles. It also confirmed that a person's abilities are demonstrated when they face obstacles, apply energy to face changes in the test, and feel more encouraged when others recognize their intelligence.

In this sense, to demonstrate the choice of people for achievement, Eccles (2005) contributed with the constructs that refer to the expectation of success, the choice of goals and social acceptance, the individual role, and the preference based on the investment of time, also the study of Gollwitzer (2012) refers that the choice of achievement has to do with an evaluation of pros and cons to assert their self-determination and does so through a process of phases that before a complex task they deliberately choose what they will occupy to use their own intelligence. All of these studies reported that the measurements made involved only students.

In relation to the expectations of fixed and learning mindset, several studies (Dweck, 2000; Wood & Bandura, 1989; Buchanan & Kern, 2017) corroborate that intelligence is a fixed trait. Dweck's (2000) theory of intelligence confirms that intelligence is malleable and can be increased.

People pursue a goal, they tend to feel intelligent in the eyes of others, and learning is a tool of their own. Wood and Bandura (1989) show that people develop their own ability to learn and improve their competence. In their study they show that self-regulation through management mechanisms are favorable for decision making. People reflect a regulatory mechanism when they face a problem situation, i.e. they are willing to modify their talent or intelligence to face a difficulty as a personal goal or strategy.

For their part, Buchanan and Kern (2017) highlight the importance of mindset to create greater chances of success of the person. The mindset reflects conditions of the person to learn and contribute to their environment, they emphasize the difference between fixed mindset and learner mindset. Also in their study they confirm that the person can cope with a shift from being an individualistic-learner to feeling like a leader of a system by finding a purpose to answer questions about the reasons for their behaviors and their effort to learn. The benefits of the mindset could have an influence on individual leadership and on the collective, creating the future as a complement of evolution.

It is noted that the studies of ((Dweck, Chiu and Hong 1995; Dweck, et al. 1999; Dweck 2000; Eccles, 2005; Gollwitzer, 2012; Wood and Bandura, 1989; Buchanan and Kern, 2017), all of them reported that the measurements made involved only students.

In relation to the articles published on the fixed mindset and the learning mindset, there has been discussion about their importance for the development of the person and their learning to learn from their own potential, and there has also been an increase in publications in recent years that show interest in the subject.

The researches explored propose a new approach for people to maintain their own capabilities, starting from their beliefs and putting it to benefit in all their relationships such as in school, in business, and in any activity that requires putting their performance into action.

The purpose of this research is to describe and develop multiple scale reagents to measure the type of fixed mindset and learner mindset, based on assessments of the theories analyzed.

This study empirically confirms two dimensions of mindset: fixed mindset and learning mindset developed three sections. The first section with 20 reagents to identify the factors of fixed and learning mindset (intelligence/talent). The second section with 22

reagents to identify the factors of fixed and learning mindset (challenge mindset). The third section with 28 reagents to identify the fixed and learner mindset factors (self-efficacy mindset). Production supervisors from the maquiladora industry participated in this study to experimentally confirm the questionnaires applied to the selected groups through factor analysis and their reliability.

The purification of the scale after three data collections through computer analysis using SPSS program, the data were run to obtain the extraction of 15 fixed mindset reagents with an analysis of variance of 74.72, with a coefficient (Cronbach's alpha) of .811 loaded on 4 dimensions (constructs) and the extraction of 18 learner mindset reagents with an analysis of variance of 73.75, with a coefficient (Cronbach's alpha) of .835 loaded on 4 dimensions (constructs).

The result of 33 reagents to determine the scale that tests validity and confidence were based on previous studies of (Dweck, Chiu and Hong 1995; Dweck, et al. 1999; Dweck 2000; Eccles, 2005; Gollwitzer, 2012); it can be seen that past research efforts to corroborate that fixed mindset and learner mindset are distinctive traits of each individual and can be identified.

For their part, the studies of Buchanan and Kern (2017), Dweck (2000), Wood and Bandura (1989), have made a great contribution to the knowledge of the behavior of students for a better understanding of their evolution and personal development.

However, it is necessary to verify these conditions in other environments different from the school one in order to have more reference of people's development behaviors, as in the industrial production that is the reason of this research. We can conclude that the potential of people from the point of view of the type of fixed mentality or learning mentality by which they develop in their school, social, and productive environments, is currently unknown. The contribution of this study can be a reference for future research, the scale can be used in the measurement of the fixed mentality and apprehensive mentality that people have and have a new approach to the potential and development of each person.

The benefits of this scale can determine whether a person can perform better in the workplace if their fixed mindset or learning mindset is known. This could be a trigger to design complementary human resource assessments to design training and human development programs. The testing of this scale is limited to measurements of groups of production supervisors in the Reynosa maquiladora industry. It is necessary to continue testing on more groups of participants from different regions and production sectors to increase its confidence and validity.

This research was conducted without including production supervisors of the maquiladora industry in the city of Reynosa, Tamaulipas. For the object of study, neither the companies nor the participants were randomly selected, since this limits the generalization of the results. Although this allowed us to accommodate factors that implicate the heterogeneity of the measurements in terms of fixed and learner mentality to determine a standard scale in adults, it is very necessary to continue doing research in diverse productive sectors to broaden its understanding.

Because of pandemic constraints, access to personal interviews and permission to collect other personal data from respondents was difficult. Surveys were administered online.

The continuity of this research and the use of the scale will facilitate decision making for selection, hiring, induction, training, and development of personnel by labor

competencies. This scale will allow other users such as employers, consultants to have as a reference for future research in the field of productivity in various productive sectors.

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