

# Self-Perception of Universal Design for Learning in Young People Studying in Professional Education Science Programs

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## Abstract

Learning involves an important challenge, in which unnecessary barriers must be eliminated, without eliminating the necessary challenges. In that sense, it is universal learning design (UDL) that encourages the creation of flexible designs that provide effective instruction to all learners. This descriptive study compares the self-perception of the UDL among young university students studying in professional programs in the area of educational sciences at a private university according to the professional program, gender and training received. Participated 271 university students in professional programs in the area of Educational Sciences, whose age range was between 20 and 30 years old. The professional programs of Physical Education, English, Science, Mathematics, Special Education, Basic Pedagogy, Language and Preschool Education were included. Self-perception of Universal Design for Learning (UDL) was measured through the Survey technique, using as an instrument the questionnaire proposed by Sánchez-Fuentes, Castro Durán, Casas Bolaños, & Vallejos Garcías (2016), which has 25 questions and includes the three principles of the UDL. The results showed that the students in the preschool program reflected higher average values than their counterparts in other professional programs (83.6±12.2 points), followed by special education (60.4±9.8 points) and language (60.8±6.6 points) ( $p<0.05$ ). Female students reflected higher self-perception (59.3±8.9 points) than male students (51.8±11.4 points). Students who have received training in UDL have higher average values (61.75±11.63 points) in relation to those who did not receive training (57.65±12.52 points) ( $p<0.05$ ). Students in the preschool education program, as well as those who received training and women in general, have reflected a better self-perception in UDL in relation to their counterparts. These results suggest the implementation of programs and educational resources to improve the perception of UDL, especially among men.

**Keywords:** universal design for learning, self-perception, university students

## 1. Introduction

The Universal Design for Learning (UDL), was born in the field of neuroscience to support diversity in the classroom (Segura-Castillo & Quiros-Acuña, 2019). It was created to serve a diverse set of students with a wide range of sensory, motor, cognitive, affective, and linguistic skills (Hitchcock, & Stahl, 2003). UDL, although well established in architecture and other domains, is relatively new in education, and even newer in higher education (Rose, Harbour, Johnston, Daley, & Abarbanell, 2006). It basically focuses on removing barriers through initial designs that consider the needs of diverse individuals, rather than overcoming barriers later through individual adaptation (Rose et al, 2006).

The general description of UDL is founded on the premise that the traditional curriculum is difficult to access for some students, as these students have learning preferences and needs that differ from those of the traditional learner (Meyer, Rose, & Gordon, 2014). Thus, it is recognized that people in general have a variety of disabilities, body types, ways of thinking and being, including different abilities, skills, interests, and needs. The UDL aims to develop a more expansive, varied, flexible, and tailored curriculum, fostering the elimination of barriers to learning and participation by the student population (Alba, Sanchez & Zubillaga, 2014; Simon, et al., 2016).

In fact, the UDL has been developed and validated specifically to meet the needs of the full range of students, which, in fact, schools have students with a variety of sensory, motor, cognitive, linguistic, affective and disability skills (Hitchcock, & Stahl, 2003). UDL principles address access to dynamic teaching and learning processes, not access to fixed building structures, or even to information (Rose et al, 2006). Three fundamental principles are highlighted in the UDL. The first principle of the UDL, is the one of the motivation and interest, it refers to the why? of the learning (Segura Castillo & Quiros-Acuña, 2019). Not all students are committed to the same extrinsic rewards or conditions, moreover, they do not develop intrinsic motivation along the same path (Rose et al, 2006), and so it is necessary to motivate students by providing relevant feedback, setting goals and giving rewards for assigned tasks. This implies that young people must be committed, cooperate and become aware of why they learn. The second principle refers to the fact that the teaching staff must provide in its pedagogical mediation multiple forms of representation, i.e. the what? of learning. It is based on the idea that learners will perceive and process information in different ways. To this end, different options will be offered for accessing the content, both perceptually and comprehensively. The third principle of UDL refers to the students' ability to express their learning, which they acquire during the pedagogical mediation, is the how? of learning. This means that students vary in their abilities to demonstrate their learning, so it is necessary to provide flexible ways and multiple active methodologies that allow them to express their knowledge and/or demonstrate their skills. This is why university teachers can meet the needs of students by allowing them to demonstrate their knowledge through various methods, known as multiple means of action and expression (Glass, Meyer, & Rose, 2013).

As a result, as far as we know, several studies have been carried out on university students at the international level (Schelly, Davies, & Spooner 2011; Alba Pastor, Zubillaga del Río, & Sánchez Serrano, 2015; Sánchez-Fuentes, Castro Durán, Casas Bolaños, & Vallejos Garcías, 2016; Chuquimarca, Rodriguez, & Bedón 2018; Aguilar, Moríña, & Perera, 2019) and few in the Chilean population, both in teachers (Lagos Garrido, 2019) and former university students (Acosta-Sánchez, 2016; Sánchez-Fuentes, Jiménez-Hernández, Sancho-Requena, & Moreno-Medina, 2019). These have been basically interested in understanding the principles of the UDL, especially the value of learning development in the school and university system.

In that sense, based on the fact that the population of university students is increasingly diverse and higher education institutions welcome students who have different points of view, experiences, skills, backgrounds, interests, histories, socioeconomic status, to name a few (Buzzard, Crittenden, Crittenden, & McCarty, 2011). In addition, they are charged with educating students from diverse backgrounds, including non-traditional students, military students, first-generation college students, and students with disabilities (Boothe, Lohmann, Donnell, & Hall, 2018), this study assumes that it is likely that there are differences in the self-perception of UDL among young university students studying professional programs in the area of educational sciences at a University in Chile. For UDL inspired curricula are currently limited to a few countries that are similar in culture and socioeconomic conditions and are unfortunately in the early stages (Al-Azawei, Serenelli, & Lundqvist, 2016).

Therefore, this research aims to compare the self-perception of UDL among university students studying professional programs in the area of educational sciences based on the professional program, gender and training received from university students in a private University in Chile.

## **2. Methods**

### *2.1. Type of Study and Sample*

A descriptive (comparative) study was designed on 271 university students from professional programs in the area of educational sciences. Seventy-three men and 198 women were selected in a non-probabilistic way for convenience. The age range was between 20 and 30 years old. The students were recruited on a voluntary basis from a private university in the city of Talca (Chile).

Eight professional programs were included (Physical Education, English, Science, Math, Special Education, Basic Pedagogy, Language and Preschool Education) and the youth who completed the survey in its entirety. Students in the religion program (n=04) and those who were not in professional practice were excluded. The study was conducted in accordance with the Declaration of Helsinki Declaration for Research on Human Subjects and in accordance with the Local Ethics Committee. All volunteers signed the informed consent.

### *2.2. Techniques and Instruments*

The survey technique was used to measure the perception of University Learning Design (UDL) in students of Education Science programs. The instrument applied was the questionnaire proposed by Sánchez-Fuentes, et al, (2016). This instrument measures teachers' perceptions of UDL in students of educational sciences. It has 26

questions and its alternatives were: Four response options: (0) Never; (1) Sometimes; (2) Almost always; and (3) Always.

The operationalization of the instrument includes: Principle III (Provide multiple means for representation) includes items 4, 6-9, 11-13 and 19; Principle I (Provide multiple means for participation) of the UDL includes items 3, 10, 15-18, 20, 22-26; and Principle II (Flexibility and individualization in learning) includes items 1, 5, 14 and 21

This instrument was validated by means of exploratory factor analysis [The correlation matrix adequacy indices show optimal values with the Bartlett statistic = 1599.7 (df = 325;  $p = 0.00$ ) and the Kaiser-Meyer-Olkin (KMO) test = 0.90] and its reliability was evidenced in the original study by a Cronbach alpha of  $r=0.83$  to  $0.89$  (in all three factors), while for the research it reflected a Cronbach's alpha of  $r=0.90$ .

The whole evaluation procedure was carried out in the university and college premises, where the students were doing professional practices. The time to answer the questionnaire was 15 to 20 minutes. The traditional method of paper and pencil was used to answer the questions. The evaluations were conducted by two professionals in education sciences, previously trained, and with extensive experience in the application of survey techniques.

### 2.3 Statistical Analysis

The descriptive statistics of frequencies, percentages, means and standard deviation were used for the statistical analysis. The differences between sexes were verified through t tests for independent samples. The differences between professional programs were verified by means of the one-way Anova and the Tukey specificity test. In all cases  $p < 0.05$  was considered significant. Cohen's d was calculated, as a measure of the effect size in the comparison of the independent groups, where Cohen's d values lower than 0.20, was considered to be no effect. Values between 0.21 to 0.49 as a small effect, values ranging from 0.50 to 0.70 indicate a moderate effect, and values higher than 0.80 indicate a large effect (Cohen, 1998). The calculations were made in Excel spreadsheets and in SPSS 18.0.

### 3. Results

Table 1 describes the variables that characterize the sample studied. It shows the percentage of participation of the eight professional programs in the area of educational sciences. Twenty-six percent of the participating sample were men and 73.1% were women. In relation to the center of practice of the university students, who are distributed in public, private and municipal schools, it is observed that the highest percentage, equivalent to 68.3%, carry out their practices in public schools. Of the total participating sample, 57.6% received training in UDL.

Table 1. Variables that characterize the sample studied

Variables	n	%
<b>Sex</b>		
Male	73	26.9
Female	198	73.1
Total		100.0%
<b>Professional career</b>		
Physical Education	28	10.3
English	23	8.5
Science Education Mention	19	7.0
Mathematics	26	9.6
Special Education	47	17.3
Basic General Education	76	28.0
Language	30	11.1
Preschool Education	22	8.1
Total	271	100.0%
<b>Practice Center</b>		
Public	185	68.3
Subsidized	76	28.0

Private	10	3.7
Total		100.0%
<b>Training in UDL</b>		
Yes	115	42.4
No	156	57.6
<b>Total</b>		<b>100.0%</b>

Comparisons of mean and ±SD values between professional programs grouped by factor [Provide Multiple Means for Representation (PMMR), Provide Multiple Means for Participation (PMMP), and Flexibility and Individualization in Learning (FIL)] are shown in table 2

In all three factors (PMMR, PMMP, and FIL), young students in the preschool program have obtained higher and more significant values than their counterparts in the other professional programs (special education, language arts, basic pedagogy, mathematics, science, English, and physical education) and young people in the mathematics program have obtained the lowest scores in factor II (PMMP) and III (FIL), while physical education students have obtained low scores in factor I (PMMR) in relation to the other professional programs. In general, students in the preschool program have obtained higher UDL self-perception than their counterparts in the other professional programs (p<0.05).

Table 2. Comparison of UDL self-perception by professional program

Professional Program	n	Provide multiple means for representation (PMMR)		Provide multiple means for participation (PMMP)		Flexibility and individualization in learning (FIL)		Self-perception of UDL (total)	
		X	SD	X	SD	X	SD	X	SD
Physical Education	28	17,6	3,5	26,9	4,5	9,9	1,8	54,4	7,9
English	23	18,9	3,3	26	5,8	9,1	1,9	54	9,6
Science	19	19,7	4,2	25,5	6,6	9,7	2,1	54,9	12,2
Mathematics	26	18,3	3,1	24,7	4,7	8,9	1,7	51,9	8,3
Special Education	47	20,4	4,1	30	5	10	1,6	60,4	9,8
Basic Pedagogy	76	20,7	4,5	28,1	6,3	9,9	1,9	58,7	11,7
Language	30	21,5	2,4	29,1	3,7	10,3	1,5	60,8	6,6
Preschool Education	22	28,3	3,2	41,7	3,7	13,5	1,3	83,6	6,7
Total	271	20,6	4,5	28,8	6,6	10,1	2	59,4	12,2

Legend: X: average, SD: standard deviation, UDL: universal learning design

When compared by gender, women had higher values in self-perception of UDL (59.3±8.9 points) than men (51.8±11.4 points), (p<0.05). University youths who received training in UDL reflected significantly higher values (61.75±11.63 points) than those who did not receive training (57.65±12.52 points) (p<0.05).

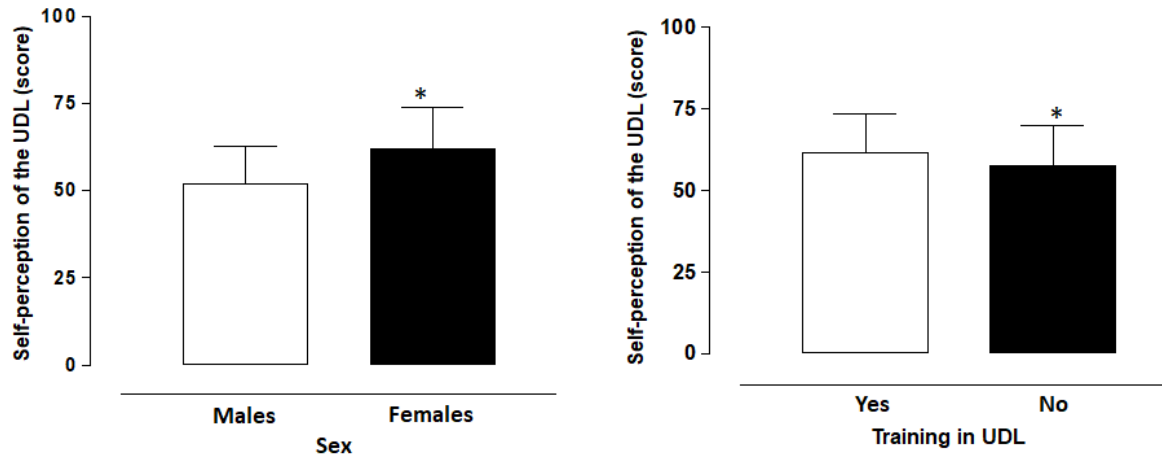


Figure 1. Comparison of the Median and  $\pm$ SD values of the Self-perception of the UDL in students of professional programs in the area of education sciences.

#### 4. Discussion

This study aimed to compare the self-perception of UDL among young university students studying in professional programs in the area of educational sciences in terms of professional program, gender and training in students from a private university in Chile.

The results have shown that female preschool students have reflected higher average values than their counterparts in other professional programs, followed by special education and language. It has also been verified that female students have reflected higher self-perception than male students. This demonstrates a clear difference in self-perception among students from various programs in the area of educational sciences. Since all students learn in different ways, whether they have a disability or not (Schreffler, Vasquez, Chini, & James, 2019), self-perception of the UDL may vary due to multiple factors. For example, it will depend on the type of courses, learning experiences, hands-on teaching, learning environments, and student assessments (Al-Azawei, et al, 2016). In fact, preschool students have the highest levels of self-perception in UDL, so the incorporation of UDL principles in UDL students is more advanced and developed, perhaps because it can create more inclusive and accessible learning experiences for school children (Diez-Villoria & Sánchez Fuentes, 2015).

Comparisons between genders, we observed that female students presented better self-perception values in relation to males. This could be due to the fact that women have a greater and better vision of the objectives sought by the UDL in comparison with the male gender (González-Fernández, Guangua Silva, & Saravia Albornoz, 2018), including, according to Jiménez Fernández (2002), the fact that women have a special sensitivity for capturing the needs of others, especially those who are closest to them and who are most in need.

With regard to training in the UDL by students in educational science programs, results have shown that university students who have received training reflect better levels of self-perception than their untrained peers. This implies that the acquisition of knowledge and the ability to use it in a meaningful way allows manipulating the newly learned content through their respective pathways of understanding (Kohler-Evans, Rutledge, & Dowd Barnes, 2019), so apparently promoting accessibility in UDL related content, may be relevant for future educators, especially if the goal of education in general is to take every student and help them reach their potential, then it makes a lot of sense to seriously consider the use of UDL in all classrooms (Laurian-Fitzgerald S & Fitzgerald, 2017).

Recently some authors such as Nieminen & Pesonen (2020) have highlighted that, in the field of higher education, the concept of UDL is often used to promote learning environments that are accessible to all students, for whom they must be constantly trained. This means that the student benefits by acquiring the construction of knowledge, life skills, attitudes and inclusive values, while at the same time promoting improvements in training and working conditions, becoming promoters of student competencies, encouraging and guiding vocational and professional development (Alba et al, 2014).

In this context, training and education in the UDL, it seems that is imminent, since a practical implementation from the principles and through the design of appropriate strategies, can eliminate the obstacles that limit some students

(Gaviria, 2020), so it is relevant to develop activities in educational programs that allow to know and design learning content of the UDL (OHRC, 2018).

Therefore, the construction of an adequate focus on the UDL is particularly relevant for higher education students, since the educational environments of the classroom currently need not only qualified and trained personnel, but also infrastructure to be able to attend and face the new educational scenarios.

In general, the UDL is a promising strategy to support students with disabilities, which emphasizes multiple ways of presenting the curriculum to involve all students (Basham & Marino, 2013), therefore, the fundamental premise is that spaces, products and other elements or processes should be designed so that the maximum number of people can use them without modification. In this context, universities have an obligation to serve all students, regardless of their personal characteristics or conditions, where the same opportunities must be offered to cater to the diversity of students (Díez Villoria & Sánchez Fuentes, 2015). Therefore, educational researchers, policy makers, and practitioners in general, must embrace UDL to meet the needs of an increasingly diverse student population (Israel, Ribuffo, Smith, 2014).

This study presents some limitations, which should be recognized, for example, the selection of the sample was not probabilistic, so it is not possible to generalize to other contexts, in addition, it was not possible to evaluate the amount of training received by students, and whether these were conducted inside or outside the University. Based on these considerations, the results obtained in this study should be analyzed with caution and future studies should control for such aspects.

It also highlights some strengths, given that it is one of the first studies conducted in Chile in higher education, suggesting urgent training in apprenticeships aligned with the UDL. In addition, the findings obtained in this study can serve to generate educational policies at the university, as well as serve as a baseline for future comparisons, especially if the aim is to compare positive and/or negative trends in the self-perception of UDL.

## 5. Conclusions

Following the results obtained, this study concludes that students in the professional preschool education program, as well as those who received training and women in general, have reflected a better self-perception in the UDL in relation to their counterparts. These results suggest the implementation of programs and educational resources to improve the self-perception of UDL especially in men, as well as to generate learning competencies for flexible, accessible and adaptive environments, according to the individual needs of the students.

## References

- Acosta Sánchez, M. (2016). *Estrategias motivacionales para ser utilizadas desde el enfoque del Diseño Universal de Aprendizaje-DUA, por estudiantes en práctica profesional de la carrera de Educación Parvularia del Instituto Profesional IPCHILE, en el desarrollo curricular de las experiencias de enseñanza-aprendizaje implementadas en el aula, con niños y niñas de nivel transición I y II en jardines infantiles de la Comuna de Puente Alto y San Miguel* (Doctoral dissertation, Universidad Finis Terrae (Chile) Facultad de Educación y Ciencias de la Familia).
- Aguilar, N. M., Moriña, A., & Perera, V. H. (2019). Acciones del profesorado para una práctica inclusiva en la universidad. *Revista Brasileira de Educação*, 24, e240016. <https://doi.org/10.1590/s1413-24782019240016>
- Al-Azawei, A., Serenelli, F., & Lundqvist, K. (2016). Universal Design for Learning (UDL): A content analysis of peer reviewed journals from 2012 to 2015. *Journal of the Scholarship of Teaching and Learning*, 16(3), 39-56. <http://doi.org/10.14434/josotl.v16i3.19295>
- Alba Pastor, C., Zubillaga del Río, A., & Sánchez Serrano, J. M. (2015). Tecnologías y Diseño Universal para el Aprendizaje (DUA): experiencias en el contexto universitario e implicaciones en la formación del profesorado. *RELATEC Revista Latinoamericana de Tecnología Educativa*, 14(1), 89-100. <https://doi.org/10.17398/1695-288X.14.1.89>
- Alba, C., Sánchez, J. M., & Zubillaga, A. (2014). *Diseño Universal para el Aprendizaje (DUA). Pautas para su introducción en el currículo*. Madrid: Edelvives.
- Basham, J. D., & Marino, M. T. (2013). Understanding STEM education and supporting students through universal design for learning. *Teaching exceptional children*, 45(4), 8-15. <https://doi.org/10.1177/004005991304500401>
- Boothe, K. A., Lohmann, M. J., Donnell, K., & Hall D. (2018). Applying the Principles of Universal Design for Learning (UDL) in the College Classroom. *The Journal of Special Education Apprenticeship*, 7(3), 1-13.

- Buzzard, C., Crittenden, V. L., Crittenden, W. F., & McCarty, P. (2011). The use of digital technologies in the classroom: A teaching and learning perspective. *Journal of Marketing Education*, 33(2), 131-139. <https://doi.org/10.1177/0273475311410845>
- Chuquimarca, D. K. F., Rodriguez, R. D., & Bedón, A. N. B. (2018). Propuesta de innovación educativa utilizando TICs y el Diseño Universal para el Aprendizaje implementada a la asignatura de Psicología General de la Universidad de las Fuerzas Armadas" ESPE". *Revista Ibérica de Sistemas e Tecnologías de Informação*, (E15), 292-303.
- Cohen, J. (1998). *Statistical power analysis for the behavioral sciences*. (2<sup>nd</sup> ed.). Erlbaum, Hillsdale.
- Díez Villoria, E., & Sánchez Fuentes, S. (2015). Universal design for learning as a teaching methodology to attend to diversity in the university. *Aula Abierta*, 43(2), 87-93. <https://doi.org/10.1016/j.aula.2014.12.002>
- Gaviria, I. C. T. (2020). Diseño universal de aprendizaje y currículo. *Sophia*, 16(2), 166-182. <https://doi.org/10.18634/sophiaj.16v.2i.957>
- Glass, D., Meyer, A., & Rose, D. H. (2013). Universal design for learning and the arts. *Harvard Educational Review*, 83(1), 98-119. <https://doi.org/10.17763/haer.83.1.33102p26478p54pw>
- González Fernández, R., Guangua Silva, C., & Saravia Alborno, T. (2018). *Percepción del diseño universal de aprendizaje de profesores de educación física de la Comuna de Talca* (Doctoral dissertation, Universidad Católica del Maule, Facultad de Ciencias de la Educación, Escuela de Educación Física).
- Hitchcock, C., & Stahl, S. (2003). Assistive technology, universal design, universal design for learning: Improved learning opportunities. *Journal of Special Education Technology*, 18(4), 45-52. <https://doi.org/10.1177/016264340301800404>
- Israel, M., & Ribuffo, C., & Smith, S. (2014). Universal design for learning: Recommendations for teacher preparation and professional development (Document No. IC-7). Retrieved from University of Florida, Collaboration for Effective Educator, Development, Accountability, and Reform Center website: <http://ceedar.education.ufl.edu/tools/innovation-configurations/>
- Jiménez Fernández, C. (2002). Educación, alta capacidad y género: El necesario compromiso entre hombres y mujeres más capaces. *Revista del Ministerio de Trabajo y Asuntos Sociales*, 40, 69-84.
- Kohler-Evans, P., Rutledge, C. D., & Dowd Barnes, C. (2019). Universal Design for Learning in the University Classroom. *International Research in Higher Education*, 4(1), 38-44. <https://doi.org/10.5430/irhe.v4n1p38>
- Lagos Garrido, O. M. (2019). Diseño universal para el aprendizaje: una experiencia innovadora en el aula matemática de octavo año básico. *Revista de estudios y experiencias en educación*, 18(36), 257-267. <https://doi.org/10.21703/rexe.20191836lagos3>
- Laurian-Fitzgerald, S., & Fitzgerald, C. (2017). Universal design in education. *The European Proceedings of Social & Behavioural Sciences*. Edu World 2016 7th International Conference, 389-399. <https://doi.org/10.15405/epsbs.2017.05.02.48>
- Meyer, A., Rose, D. H., & Gordon, D. (2014). *Universal design for learning: Theory and Practice*. Wakefield, MA: CAST Professional Publishing
- Nieminen, J. H., & Pesonen, H.V. (2020). Taking Universal Design Back to Its Roots: Perspectives on Accessibility and Identity in Undergraduate Mathematics. *Educ. Sci*, 10, 12. <https://doi.org/10.3390/educsci10010012>
- Ontario Human Rights Commission. OHR. (2018). *The opportunity to succeed: Achieving barrier-free education for students with disabilities*. Retrieved July 7 from: <http://www.ohrc.on.ca/en/opportunity-succeed-achieving-barrier-free-education-students-disabilities/post-secondary-education>
- Rose, D. H., Harbour, W. A., Johnston, C. S., Daley, S. G., & Abarbanell, L. (2006). Universal design for learning in postsecondary education: Reflections on principles and their applications. *Journal of Postsecondary Education and Disability*, 19(2), 135-151.
- Sánchez Fuentes, S., Castro Durán, L., Casas Bolaños, J. A., & Vallejos Garcías, V. (2016). Análisis factorial de las percepciones docentes sobre diseño universal de aprendizaje. *Revista latinoamericana de educación inclusiva*, 10(2), 135-149. <https://doi.org/10.4067/S0718-73782016000200009>

- Sánchez Fuentes, S., Jiménez Hernández, D., Sancho Requena, P., & Moreno-Medina, I. (2019). Validación de Instrumento para Medir las Percepciones de los Docentes sobre el Diseño Universal para el Aprendizaje. *Revista latinoamericana de educación inclusiva*, 13(1), 89-103. <https://doi.org/10.4067/S0718-73782019000100089>
- Schelly, C. L., Davies, P. L., & Spooner, C. L. (2011). Student perceptions of faculty implementation of Universal Design for Learning. *Journal of postsecondary education and disability*, 24(1), 17-30.
- Schreffler, J., Vasquez III, E., Chini, J., & James, W. (2019). Universal design for learning in postsecondary STEM education for students with disabilities: A systematic literature review. *International Journal of STEM Education*, 6(1), 8. <https://doi.org/10.1186/s40594-019-0161-8>
- Segura Castillo, M. A., & Quiros Acuña, M. (2019). Desde el Diseño Universal para el Aprendizaje: el estudiantado al aprender se evalúa y al evaluarle aprende. *Revista Educación*, 43(1), 734-754. <https://doi.org/10.15517/revedu.v43i1.28449>
- Simón, C., Echeita, G., Sandoval, M., Moreno, A., Márquez, C., Fernández, M. L., & Pérez, E. (2016). De las adaptaciones curriculares al diseño universal para el aprendizaje y la instrucción: un cambio de perspectiva. In Congreso Accesibilidad, ajustes y apoyos. Universidad Carlos III, Proyecto “Madrid sin barreras: discapacidad e inclusión social”. Madrid.

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