

LEARNING OF THE SUSTAINABLE DEVELOPMENT GOALS (SDG) AT PUBLIC UNIVERSITY IN CENTRAL MEXICO

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ABSTRACT

The emergency of the SARS CoV-2 coronavirus and the COVID-19 disease forced educational systems to move from face-to-face to virtual classrooms. In this scenario, the dissemination of the Sustainable Development Goals (SDG) on virtual platforms intensified immersive learning. The objective of this work was to establish the neural network of a sample of students exposed to the immersive dissemination of the SDGs during the pandemic. An exploratory, cross-sectional and correlational study was carried out with a sample of 100 professional practitioners and social servants attached to a public university in central Mexico. The results show the prevalence of four nodes related to SDGs 9, 13, 14 and 15. The present work found an innovation in the order of SDGs most widespread and assimilated by the sample and in relation to the state of the art and the limits of the sample size it is recommended to extend the study to the type of immersion: gamified, augmented or virtualized reality in order to establish significant differences by type of SDG. In this sense, the gamification of quality of life was anticipated by innovative industrialization and climate action, although the other SDGs should be modeled as predictors of quality of life without gamification and rather in a risk scenario such as the effects of climate change.

Keywords – Agenda, Immersive Learning, Quality of Life, Intellectual Capital, Sustainable Development Goals

INTRODUCTION

Human Development is structured at different levels (Lombard, 2015). The individual or personal level where theories that explain the impact of childhood on the other stages of life prevail (Jayasooria, 2016). Next, the interpersonal level where the influence of relationships between humans with respect to third parties is analyzed (Muleya, 2020). Then, the group level where differences are observed within the group or compared to other groups with respect to their needs, expectations or resources in the face of conflicts and changes (Cordoba & Bando, 2022). Finally, the collective, social or ideological level where the discipline appreciates the logic of centrality as a guide for economic, political and social decisions with respect to the periphery as a provider of natural and human resources for the development of centrality (Bromfield & Duarte, 2022).

From this level of explanation approach, Human and Sustainable Development are linked by the relationships between individuals, groups and societies (Cox, 2020). It is true that the literature and curricular plans do not link and rather oppose the SDGs with Human Development by reducing it to an individual level, but recent studies suggest that both face the challenges of climate change (Nhapi & Pinto, 2023). Therefore, the Comprehensive Disaster Risk

Management (GIRD) and the Civil Protection Frameworks (MPC) warn that the threats, risks and dangers of climate change make individuals, groups and societies more vulnerable and resilient (Rice et al., 2022).

In this new paradigm, the quality of life shows competitive advantages that make it a central node of communication; prevention and risk reduction (Healy, 2017). In this way, Human Development is linked to Sustainable Development (Sanhueza et al., 2022). Such is the case of quality of life models within which are the analysis of the vulnerability, resilience, helplessness, and happiness or subjective well-being (Pandey & Kumar, 2018). These are the variables that would allow a diagnosis of the impact of risks, dangers, and threats on individuals, groups, and societies (Whittaker & Taylor, 2017). Such variables can be observed indirectly in the classroom (Marti Haidar et al., 2023). In this sense, immersive learning, defined as the communication of content through gamification, virtuality or augmented reality, can serve to transfer communication, prevention and risk reduction in the classroom (Shatberashvili & Sadzaglishvili, 2022).

Consequently, the inclusion of immersive learning about risks in the classroom will allow updating the Human Development subject and specifying its relationship with the SDGs (Addo et al., 2022). The objective of this work was to analyze the relationship between the SDGs and Human Development through immersive learning published in the literature from 2020 to 2023. Are there significant differences between the SDGs disseminated in social digital networks with respect to immersive learning of the SDGs in the classroom?

Hypothesis 1: Given that the SDGs and quality of life can be reduced to a minimum expression for teaching and learning in the classroom, significant differences are expected between the universal guidelines and their dissemination through gamification, augmented reality or virtuality.

Hypothesis 2: If the SDGs and quality of life can be made affordable through immersive learning, then reduced dissemination of the SDGs in the classroom through Comprehensive Disaster Risk Management (IDRM) paradigms or International Protection Frameworks will be possible. Civilian (MIPC). In this way, the differences between the general and immersive contents suggest differences in terms of gamification, augmented reality or virtuality in Higher Education Institutes (HEIs).

Hypothesis 3: If there are differences between the SDGs with respect to immersive broadcasting, then impacts on quality of life and its dimensions of life satisfaction, opportunity expectations, and perceived resources will be anticipated.

MATERIALS AND METHOD

A cross-sectional, exploratory and correlational study was carried out with a sample of 100 ($M = 21.23$ $DE = 4.3$ years and $M = 9'897.00$ $DE = 4'762.00$ monthly income) professional practitioners and social servants of Information and Communication Technologies (ICT), Learning and Knowledge Technologies (TAC) and Empowerment and Participation Technologies (TEP) at a public university in central Mexico.

The Immersive Learning Inventory was used, which includes 17 items around three dimensions of analysis:

1. **Gamification:** The first SDG related to poverty will be more important if it is disseminated as a game.
2. **Virtuality:** The fifth SDG alluding to gender equality will be more relevant if it is disseminated virtually.
3. **Augmentation:** The seventh SDG regarding affordable and non-polluting energy will be more credible if it is disseminated increased.

Each item includes five response options ranging from 0=not at all agree to 5=quite agree. The reliability reached alpha and omega values of 0.753 and 0.748, as well as correlations between the respective factor and item that ranged between 0.435 and 0.567.

The Quality of Life Gamification Scale was used, which includes 9 items structured in three dimensions related to: life satisfaction (The fourth SDG regarding quality education will be more satisfactory if its gamification is systematic), perceived resources (The fifth SDG related to gender equality will be more useful if real cases are disseminated in socio-digital networks), expectations of opportunity (The eighth SDG associated with decent work and economic growth will be more convincing if it is exhibited in augmented reality). Each item is answered with seven response options ranging from 0=it does not look like my situation at all to 7= it looks a lot like my situation. The reliability of the general scale and the subscales reached alpha and omega values that ranged between 0.745 and 0.770, as well as item factor correlations between 0.324 and 0.567.

Respondents were contacted through institutional mail. Confidentiality letters were attached to guarantee anonymity and information about the objectives of the study and those responsible for the project. In a focus group session the concepts were equated, in another Delphi the items were evaluated and in a final session the respondents answered the final instrument.

The coefficients of centrality, grouping and structuring were estimated in order to contrast the study hypotheses. The values of the parameters that approached the unit were assumed as evidence of non-rejection of the hypotheses.

RESULTS AND DISCUSSION

The centrality, estimated by four indicators, suggests that the immersive learning of SDG 13 related to climate action is a regulator of the other nodes. In this sense, the immersive learning of SDG 13 differs from the other nodes in that it filters its impact on the study sample. In fact, SDG 13 reduces the impact of the other SDGs established as learning information nodes (see Table 1).

Variable	Betweenness	Closeness	Strength	Influence
SDGs1	-0.581	0.684	0.573	-1,204
SDGs2	-0.215	0.822	-0.529	0.352
SDGs3	1,614	1,073	1,155	-1,254
SDGs4	0.333	-0.136	-0.766	-0.528
SDGs5	-0.581	-1,997	-1,823	-0.959
SDGs6	-0.764	-0.594	0.849	-0.72
SDGs7	-0.581	-0.948	-0.091	1,385
SDGs8	-0.947	-1,778	-1,830	0.711
SDGs9	-0.215	-0.529	-0.798	-0.484
SDGs10	-0.398	0.012	0.014	1,275
SDGs11	-0.947	-0.548	0.149	-0.78
SDGs12	-0.581	0.209	0.562	1,405
SDGs13	2,162	1,568	1,047	1,280
SDGs14	-0.032	0.525	0.683	0.735
SDGs15	1,065	1,349	1,099	0.385
SDGs16	-0.947	-0.039	-1,215	-0.222
SDGs17	1,614	0.328	0.922	-1,376

The grouping measured by four other coefficients suggests that SDG 14, alluding to underwater life, reconfigures the other SDGs established as information, dissemination and learning nodes. Therefore, the regulation of the SDGs, although it is established by node 13, which suggests direct action against climate change, is complemented by SDG 14, referring to the importance of reefs as CO2 collectors and oxygen producers (see Table 2).

Table 2
CLUSTERING MEASURES PER VARIABLE NETWORKS

Variable	Barratt	Onnela	WS	Zhang
SDGs1	-0.38	0.353	-0.667	-0.046
SDGs10	2,081	0.77	2,128	0.431
SDGs11	-0.282	0.327	-0.667	0.945
SDGs12	-0.143	-0.209	-0.16	1,969
SDGs13	1,396	1,281	1,192	-1,644
SDGs14	1,410	0.677	2,128	1,542
SDGs15	-1,474	0.711	-0.667	-0.713
SDGs16	0.377	-0.593	-0.16	-0.617
SDGs17	-0.925	0.359	-0.667	0.641
SDGs2	-0.469	-0.609	-0.667	-0.452
SDGs3	1,201	2003	1,192	-1,012
SDGs4	-0.891	-0.733	-0.16	-0.957
SDGs5	-0.191	-1,775	-0.16	0.461
SDGs6	-0.946	0.569	-0.667	-0.172
SDGs7	-0.79	-0.703	-0.667	1,075
SDGs8	0.405	-1,535	-0.667	-0.541
SDGs9	-0.377	-0.894	-0.667	-0.908

Structuring anticipates the input and output of information. In the case of node 13, it was related to node 9 related to industry, innovation and infrastructure (.534). It means, then, that climate action has its principle of a learning network in industrialization with social responsibility. In the case of node 14, it was associated with node 15 alluding to the life of terrestrial ecosystems (.729). In other words, responsible production and consumption ends with the balance of terrestrial ecosystems (see Table 3).

Table 3
WEIGHTS MATRIX NETWORKS

	SD Gs1	SD Gs2	SD Gs3	SD Gs4	SD Gs5	SD Gs6	SD Gs7	SD Gs8	SD Gs9	SD Gs10	SD Gs11	SD Gs12	SD Gs13	SD Gs14	SD Gs15	SD Gs16	SD Gs17
SD Gs1	0,000	0,222	-0,236	0,017	0,017	0,257	-0,234	0,224	-0,101	-0,122	-0,452	0,602	0,365	0,51	-0,036	-0,047	-0,0566
SD Gs2	0,222	0,000	0,593	0,233	-0,105	-0,075	0,005	-0,008	0,293	0,009	0,194	0,015	-0,487	0,215	-0,52	0,366	0,018
SD Gs3	-0,236	0,593	0,000	-0,141	-0,301	0,483	0,504	0,091	-0,207	0,407	-0,232	0,246	0,365	0,000	0,156	-0,213	-0,4031
SD Gs4	0,017	0,233	-0,141	0,000	0,334	-0,106	0,014	0,294	-0,3036	0,187	-0,035	-0,351	0,383	-0,401	0,491	0,000	-0,002

SD Gs5	0.0 17	- 0.1 05	- 0.3 01	0.3 34	0,0 00	- 0.3 96	0.5 39	0.1 15	- 6,9 94	0.2 33	0.0 75	0,0 00	0.1 39	- 0.0 62	0.0 15	- 0.2 01	- 0.1 39
SD Gs6	0.2 57	- 0.0 75	- 0.4 83	- 0.1 6	- 0.3 96	0,0 00	0.8 57	0.0 97	- 0.2 48	0.8 52	0.1 01	- 0.0 68	- 0.0 8	- 0.1 25	- 0.1 47	0.2 85	- 0.2 65
SD Gs7	- 0.2 34	0.0 5	0.5 4	0.0 14	0.5 39	0.8 57	0.0 00	0.0 23	0.1 09	- 0.6 64	- 0.1 6	0.0 32	0.1 32	0.0 93	0.1 36	- 0.0 6	0.2 12
SD Gs8	0.2 24	- 0.0 8	0.0 91	0.2 94	0.1 15	0.0 97	0.0 23	0.0 00	0.4 85	- 0.0 54	0.1 69	0.0 66	- 0.4 79	0.0 23	- 0.1 06	0.1 93	0.1 68
SD Gs9	- 0.1	0.2 93	- 0.2 7	- 0.3 36	- 6,9 94	- 0.2 48	0.1 09	0.4 85	0.0 00	0.3 22	- 0.2 12	0.0 66	0.5 34	- 0.1 39	0.1 47	- 0.1 01	- 0.0 1
SD Gs10	- 0.1 22	0.0 9	0.4 07	0.1 87	0.2 33	0.8 52	- 0.6 64	- 0.0 54	0.3 22	0.0 00	0.0 83	- 0.0 79	0.0 00	0.0 00	0.2 1	- 0.2 67	0.3 57
SD Gs11	- 0.4 52	0.1 94	- 0.2 32	- 0.0 35	0.0 75	0.1 01	- 0.1 6	0.1 69	- 0.2 12	0.0 83	0.0 00	0.6 16	0.3 83	0.5 1	- 0.2 12	0.0 6	- 0.5 23
SD Gs12	0.6 02	0.0 15	0.2 46	- 0.3 51	0.0 00	0.0 68	0.0 32	0.0 66	0.0 66	- 0.0 79	0.6 16	0.0 00	- 0.0 07	- 0.8 31	0.6 06	0.0 64	0.6 53
SD Gs13	0.3 65	- 0.4 87	0.3 65	0.3 83	0.1 39	- 0.0 8	0.1 32	- 0.4 79	0.5 34	0.0 00	0.3 83	- 0.0 07	0.0 00	0.1 19	- 0.4 83	0.4 84	0.1 91
SD Gs14	0.5 1	0.2 15	0.0 00	- 0.4 01	- 0.0 62	- 0.1 25	0.0 93	0.0 23	- 0.1 39	0.0 00	0.5 1	- 0.8 31	0.1 19	0.0 00	0.7 29	- 0.0 12	0.6 14
SD Gs15	- 0.0 36	- 0.5 2	0.1 56	0.4 91	0.0 15	- 0.1 47	0.1 36	- 0.1 06	0.1 47	0.2 1	- 0.2 12	0.6 06	- 0.4 83	0.7 29	0.0 00	0.3 66	- 0.3 09
SD Gs16	- 0.3 47	0.3 66	- 0.2 13	0,0 00	- 0.2 01	- 0.2 85	- 0.0 6	0.1 93	- 0.1 01	- 0.2 67	0.0 6	0.0 64	0.4 84	- 0.0 12	0.3 66	0.0 00	0.0 71
SD Gs17	- 0.5 66	0.0 18	- 0.4 31	- 0.0 2	- 0.1 39	- 0.2 65	0.2 12	0.1 68	- 0.0 1	0.3 57	- 0.5 23	0.6 53	0.1 91	0.6 14	- 0.3 09	0.0 71	0,0 00

The examined centrality, grouping and structuring values suggest non-rejection of the hypotheses. In other words, the dissemination and learning of the SDGs in the immersive classroom is centered at node 13, clustered at node 14, started at node 9, and finished at node 15. Therefore, the neural network of information and learning was established with the immersive learning of SDGs 9, 13, 14 and 15 related to industrialization and innovation, climate action, life below water and terrestrial ecosystems. That is, the SDGs that were assimilated through gamification, augmented and virtual reality suggest that species and their environment are compromised by an innovative industrialization in the making.

In order to establish the determinants of the gamified quality of life, we proceeded to estimate the trajectory model in which SDGs 9 and 13 are included as exogenous factors, nodes 14 and 15 as predictive endogenous factors. The results show that SDG 9 predicts gamification of quality of life.

Fit and residual values [$\chi^2 = 13.24$ (13gl) $p = 0.61$; GFI = 0.990; IFC = 0.995; RMSEA = 0.087] indicate non-rejection of the hypotheses. In other words, SDGs 9 and 13 are predictors of gamification of quality of life, even when the other nodes do not predict it satisfactorily. The two determining factors suggest that climate change and industry coexist in a gamification of favorable scenarios to the quality of life.

CONCLUSION AND RECOMMENDATIONS

The objective of this work was to establish the information and learning network related to the immersion of the SDGs in the classroom. The results highlight that nodes 9, 13, 14 and 15 are central axes of the revised research agenda from 2020 to 2023. In relation to the state of the art, the findings of this work indicate that the SDGs are disseminated asymmetrically in their immersive modality. . In addition, the extension of the study is suggested in order to correct the limits of the sample and its effects on the coefficients. Regarding the implications in the classroom, the study can advance towards the differentiation of the teaching and learning of the SDGs depending on the type of immersion: augmentation, virtuality and gamification. In relation to the quality of life, at least it seems to coexist and anticipate from the action in favor of climate change through the social responsibility of industrialization.

REFERENCE

Reference

- Addo, R., Koers, G., & Timpson, W. M. (2022). Teaching sustainable development goals and social development: a Case study teaching method. *Social Work Education*, 41(7), 1478-1488.
- Bromfield, N. F., & Duarte, F. (2022). Centering public impact scholarship among social work scholars to promote and contribute to the United Nations sustainable development goals. *Social Work Education*, 41(7), 1427-1440.
- Cordoba, P. S., & Bando, L. (2022). Social work and the sustainable development goals: A student placement model. *Australian Social Work*, 75(4), 519-526.
- Cox, C. (2020). The sustainable development goals and aging: Implications for social work. *Journal of Human Rights and Social Work*, 5(1), 39-47.
- Healy, L. M. (2017). Situating social work within the post-2015 Global Agenda. *European Journal of Social Work*, 20(1), 5-16.
- Jayasooria, D. (2016). Sustainable development goals and social work: Opportunities and challenges for social work practice in Malaysia. *Journal of Human Rights and Social Work*, 1(1), 19-29.
- Lombard, A. (2015). Global agenda for social work and social development: A path toward sustainable social work. *Social work*, 51(4), 482-499.
- Marti Haidar, Y. M., Akilova, M., Carlson, C., Zantaria, A., & Luo, Y. (2023). Application of social work in meeting the Sustainable Development Goals for children: A case study from Abkhazia. *International Social Work*, 66(4), 1240-1246.
- Muleya, E. (2020). Developmental social work and the sustainable development goals in south africa: opportunities and challenges. *The International Journal of Community and Social Development*, 2(4), 470-486.
- Nhapi, T., & Pinto, C. (2023). Embedding SDGs in social work education: insights from Zimbabwe and Portugal BSW and MSW programs. *Social Work Education*, 1-18.
- Pandey, U. C., & Kumar, C. (2018). A SDG compliant curriculum framework for social work education: Issues and challenges. *Implementing Sustainability in the Curriculum of Universities: Approaches, Methods and Projects*, 193-206.
- Rice, K., Fisher, C., & Moore, S. (2022). Social work and the Sustainable Development Goals: an introduction to the special issue. *Social Work Education*, 41(7), 1409-1411.

- Sanhueza, G., Sepúlveda, T. M., & Moreno, J. (2022). Innovating social work education in Chile: Addressing the UN sustainable development goals, enhancing our profession. *Social Work Education*, 41(7), 1460-1477.
- Shatberashvili, N., & Sadzaglishvili, S. (2022). SDG-Focused social work education in Georgia. *Social Work Education*, 41(7), 1507-1524.
- Whittaker, A., & Taylor, B. (2017). Understanding risk in social work. *Journal of Social Work Practice*, 31(4), 375-378.

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