

# SCIENCE STORIES THROUGH A CULTURAL LENS

## The effects of cultural framing of storytelling in the natural and social sciences

W. Finkler, L. S. Davis, D. Ruwhiu, L. Li, N. Lloyd, N. Beatson and L. Zhu

Storytelling is a critical element for the effective communication of science in online videos. However, its effect is not consistent across different cultures. Here, we review and examine cultural framing of storytelling used to communicate science, including social science, in online teaching videos. We found that students from high-context cultures engage more with online videos than do students from low-context cultures but, nevertheless, do more poorly in tests that measure knowledge obtained. Our findings highlight the need to consider the cultural framing of storytelling – cultural science communication – when communicating science to audiences from different cultures.

Keywords: **storytelling, science communication, education, cultural storytelling.**

### ■ INTRODUCTION

Evidence is accumulating that storytelling can be one of the most effective means for communicating sciences (Joubert et al., 2019), be they traditional natural sciences (Collins et al., 2023) or social sciences (Smith et al., 2023). Given that the COVID-19 pandemic has resulted in a dramatic shift by many tertiary institutions to online teaching (Adedoyin & Soykan, 2020) using online videos (Lamsal, 2022; Praveena Daya et al., 2022), the type of storytelling used in such online videos for teaching sciences could potentially enhance students' engagement and the effectiveness of teaching (Davis & León, 2018; García-Avilés & de Lara, 2018; Sherer & Shea, 2011).

The evidence to date on the effectiveness of online teaching, however, is mixed. For example, one study comparing online and in-class teaching in a medical

college in India found that online teaching provides a more personalised learning environment for students. On the other hand, traditional in-class teaching can be a more effective means for students to improve their critical thinking skills (Hajhosseini et al., 2016). Challenges that can arise with online teaching include technological difficulties (Lamsal, 2022; Taskiran, 2022) but, most critically, issues from using content that is not specifically tailored for online delivery to meet the needs of the audience. That is, many education providers merely transfer traditional course content and materials into an online form (e.g., by simply

recording lectures using Zoom and then uploading them to online platforms) without any attempt to optimize the content for the online environment by using techniques such as storytelling (Green et al., 2020; Taskiran, 2022). As a result, poorly designed

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#### HOW TO CITE:

Finkler, W., Davis, L. S., Ruwhiu, D., Li, L., Lloyd, N., Beatson, N., & Zhu, L. (2024). Science stories through a cultural lens: The effects of cultural framing of storytelling in the natural and social sciences. *Metode Science Studies Journal*, 14, 159–165. <https://doi.org/10.7203/metode.14.26592>

Feature	High-Context Narration	Low-Context Narration
Language	<b>Inclusive language:</b> use of “we” and “us”.	<b>Exclusive language:</b> no reference to the viewer.
Referencing	<b>Formal referencing:</b> narrator refers to herself as “Dr” or “Associate Professor”.	<b>Informal referencing:</b> narrator refers to herself using her first name only.
Context	<b>Personal context:</b> narrator gives anecdotes about her background and family history.	<b>Impersonal context:</b> narrator gives no personal details beyond those needed to establish her credentials.
Numeracy	<b>Relative numeracy:</b> use of relative terms such as “half” or “majority”.	<b>Precise numeracy:</b> use of precise terms such as 50% or 60%.
Translation	<b>Cultural priority:</b> using Māori (cultural) words first with an English translation and thereafter using only the Māori word (e.g., kaitiakitanga).	<b>English priority:</b> using English words first with a Māori translation and thereafter using only the English word (e.g., guardianship).

Table 1. Storytelling features used to differentiate the High-Context Narration from the Low-Context Narration. Adapted from Würtz (2005) and Meyer (2014).

online courses typically suffer from high drop-out rates (Yang et al., 2013).

Research has demonstrated that the use of storytelling in online videos can increase understanding and learning about science topics (Davis et al., 2020), although that effect is not consistent across different cultures (Davis et al., 2022). Given the recent trend towards using online videos for teaching and communicating sciences, it is, therefore, important to determine how best to frame content in ways that are appropriate to the cultural backgrounds of target audiences in order to best enhance engagement and understanding (Finkler & León, 2019; Hornikx & le Pair, 2017; Vedder, 2015).

### Cultural Framing

Storytelling using video can be a highly effective communication tool, with online on-demand videos rapidly becoming the most dominant means of communication, especially for those under 30 years of age (León & Bourk, 2018). Cultural differences influence the responses to emotional and rational appeals in communication, and these differences become especially apparent when comparing high-context and low-context cultures (Hall, 1976). High-context cultures (e.g., Māori, Chinese and Indian) rely more on emotive communication appeals and narrative elements such as the collective, while low-context cultures (e.g., UK, USA and Germany) rely more on rational appeals and narrative elements such as the individual (Usunier & Roulin, 2010; Vedder, 2015). Adapting content and storytelling to suit audiences of different

cultural backgrounds may well benefit engagement and online learning experiences (Hornikx & le Pair, 2017). However, such multicultural dimensions to the use of storytelling for online teaching remain largely untested and their actual effects are unknown (Hornikx & le Pair, 2017; Milani, 2008).

Here we provide a preliminary proof-of-concept test of the impacts of cultural framing of storytelling in online videos about a social science (economics) depending upon whether students are from low-context or high-context cultures.

### ■ PROOF-OF-CONCEPT TEST

We produced two 2-minute videos about economics (the specific topic involved business aspects associated with New Zealand’s indigenous Māori culture) to be used in a first-year Business Studies paper at the University of Otago, New Zealand. The videos were identical except for their narrations. The narrator

told the story in two different ways, which were intended to appeal to students from different cultural backgrounds: (i) the *Low-Context Narration* used a rational form of storytelling typical of individualistic cultures such as those predominant in the USA, UK, and Germany; and, (ii) the *High-Context Narration* used an emotive form of storytelling

characteristic of collectivist cultures like Māori, and those that are predominant in China and India. The specific storytelling features used in the high-context narration and the low-context narration (Table 1) were based upon those identified by Würtz (2005)

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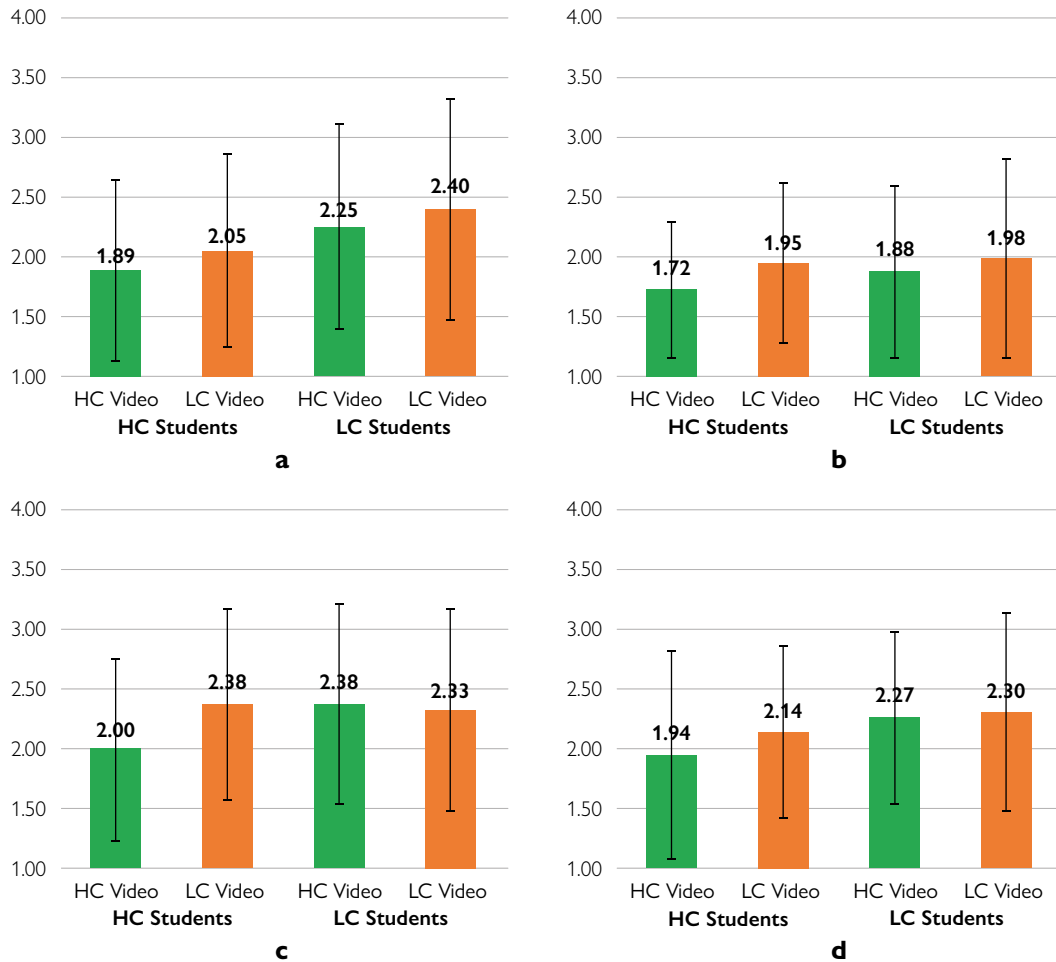


Figure 1. Mean scores given by students from high-context cultures (HC Students) versus low-context cultures (LC Students) given to the high-context video (HC Video) and low-context video (LC Video) for: (a) levels of engagement (1 = very engaging, 5 = very unengaging); (b) satisfaction with the video (1 = very satisfied, 5 = very dissatisfied); (c) perceived helpfulness of the video (1 = very helpful, 5 = very unhelpful); and (d) perceived helpfulness of the narrator (1 = very helpful, 5 = very unhelpful). Smaller numbers are more positive.

and Meyer (2014) as differing in their appeal to high-context and low-context cultures. The narrations otherwise contained the same factual information.

We tested whether the low-context and high-context narrations had differing effects depending upon whether students were from high-context or low-context cultures. The videos were presented to the students in the form of a survey, whereby students were randomly assigned to view either the video with the low-context narration (LC video) or the video with the high-context narration (HC video). After watching the video, the students completed a questionnaire, which sought their evaluations of the video through a series of multiple-choice questions about their levels of engagement, satisfaction, and their perceptions of the characteristics of the video; and four questions that tested whether they were able to correctly recall information presented in the video.

### Test Results

Of 152 students who watched the video and completed the survey, 74 watched the HC video while 78 watched the LC video. There were slightly more female participants (57.9%) than males (42.1%) and the vast majority of the participants (97.4%) were under 25 years old. Based upon their ethnic groups, 39 (25.7%) of them were from high-context cultures (HC students), and 113 (74.3%) of them were from low-context cultures (LC students).

The HC students had significantly higher levels of engagement (mean = 1.97, SD = 0.78,  $n = 39$ ) with the videos than did the LC students (mean = 2.33, SD = 0.89,  $n = 113$ ) (ANOVA,  $F = 4.85$ ,  $p < 0.05$ ). While the scores of students from low-context cultures were unaffected by the type of narration, students from high-context cultures consistently rated the high-context narration more positively across

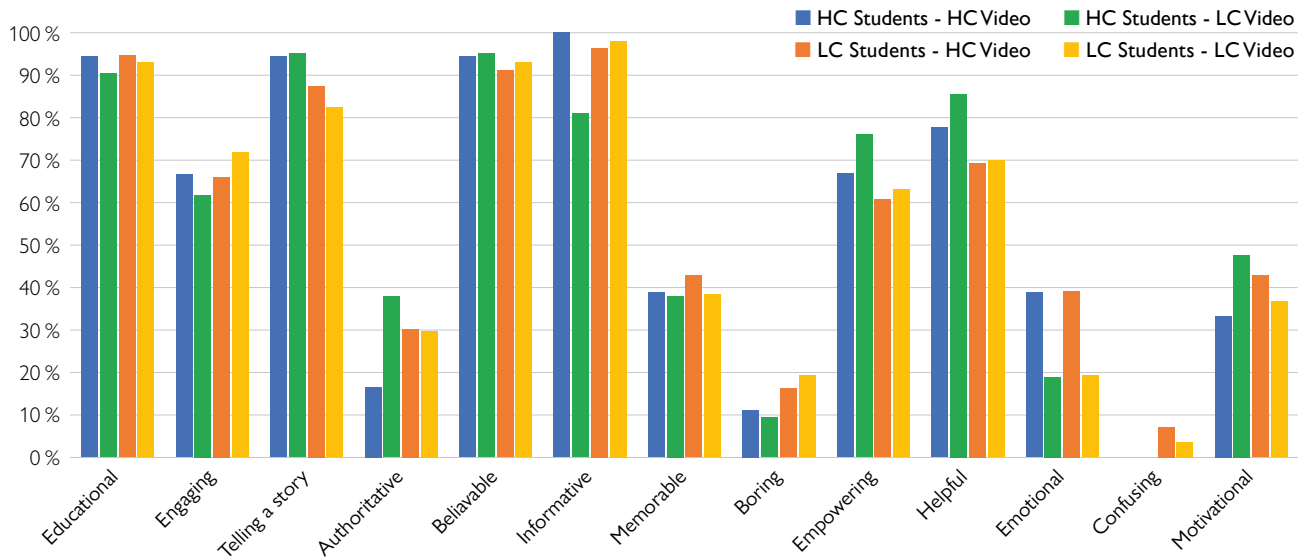


Figure 2. Perceived attributes of the videos according to whether they had a high-context or low-context narration (HC Video or LC Video) and were watched by students from high-context cultures (HC Students) or low-context cultures (LC Students). The percentage of students ascribing an attribute to each video is shown for the four possible combinations: HC Students who watched the HC Video (blue), HC Students who watched the LC Video (green), LC Students who watched the HC Video (orange), and LC Students who watched the LC Video (yellow).

all four measures (Figure 1). In sum, there was a significant difference in reactions to the videos based upon the cultural backgrounds of students and, while the reactions of students from low-context cultures were unaffected by the cultural framing of the videos, there was a trend for students from high-context cultures to view the video with the high-context narration more positively.

The students were given a list of 13 attributes that they could select to describe the video they had watched (Figure 2). Students watching the HC Video were significantly much more likely to describe it as “emotional” than the LC Video (Chi-square test,  $\chi^2 = 7.35$ ,  $p < 0.01$ ), and this was regardless of their cultural background (HC or LC Student). We had, therefore, succeeded in our aim of producing more emotive storytelling in the high-context video by applying the features listed in Table 1 to the narration, and this was recognized to a similar extent by both high-context and low-context students. HC Students were, however, significantly more likely to find the HC Video narration informative (Chi-square test,  $\chi^2 = 3.82$ ,  $p = 0.05$ ), while tending to also regard the LC Video narration as more authoritative (Chi-square test,  $\chi^2 = 2.20$ ,  $p = 0.1$ ).

Our survey questionnaire included four questions about specific content in the video for the purpose of testing the short-term recall of information presented in the video. After watching the video, LC Students got significantly more correct answers (mean = 3.12,

SD = 1.04,  $n = 113$ ) than did HC Students (mean = 2.64, SD = 1.25,  $n = 39$ ) (ANOVA,  $F = 5.66$ ,  $P < 0.05$ ). A two-way ANOVA revealed that neither the narration type (HC or LC Video) nor any interaction between the narration type and the participants’ cultural backgrounds (HC or LC Students) had a significant influence on the recall of information.

#### ■ CULTURAL FRAMING OF STORIES FOR SCIENCE COMMUNICATION

While research has shown that digital storytelling can be a useful teaching tool for providing access to culturally distinct perspectives (Grogan et al., 2021), to our knowledge, our proof-of-concept test is the first time in which storytelling that provides distinct cultural perspectives has been tested against the cultural background of audiences when it comes to the online communication of either natural or social sciences. Given the preliminary nature of our manipulations, there are encouraging suggestions for further research and ways to improve online communication by altering the cultural framing of storytelling based upon the cultural identities of the audience.

Vedder (2015) noted high-context cultures rely on an emotive communication style in contrast to the rational communication style preferred by low-context cultures. Videos have the potential to create empathy and emotional connection between an audience and

the storyteller (Grogan et al., 2021), and we were successful, through the framing of the storytelling alone, in producing a video (HC video) that was perceived as more emotive by audience members irrespective of their cultural backgrounds. While those from low-context cultures showed no preference for the emotive storytelling of the HC video, those from HC cultures displayed a persistent pattern of preferring the emotive storytelling of the HC video compared to the rational storytelling of the LC video. Storytelling that elicits emotions would seem to have great potential when it comes to communicating with high-context cultures for the purposes of teaching (Walan & Enochsson, 2019).

Despite this, students from high-context cultural backgrounds performed significantly worse on information re-call tests than did students from low-context cultures regardless of the type of narration used in the videos. Clearly, this does not result from a lack of engagement with the online videos, as our results showed that high-context students were significantly more engaged with the videos than were their low-context counterparts. It could be that emotive storytelling alone is not the most appropriate means of engagement for high-context students when it comes to learning. For example, Davis et al. (2020; 2022) found that while entertaining storytelling helped engage some parts of the audience viewing online videos about climate change, it decreased their sense of its seriousness. Something similar could be operating here, whereby even though high-context students may have been more engaged by the HC Video, they were less likely to regard it as authoritative and, therefore, less likely to take notice of the information it contained. Yet, that would not account for HC Students performing more poorly than LC Students when watching the video with the low-context narration.

Another possibility is that while emotive storytelling in videos can be engaging (Adnan & Redzuan, 2016; Chen & Wang, 2011), perhaps a key feature required for learning in high-context cultures – which are typically more socially oriented (Kim et al., 1998; Richardson & Smith, 2007) – is missing? If so, it could be that the environment and interactions that take place around viewing online

videos is important for creating cross-cultural understanding and, thereby, moving high-context students from engagement to learning (Bair et al., 2022; Dunn & Cherup, 2021). It would be good to test whether using a delivery mechanism for online videos about science that enhances social interaction amongst the audience (e.g., allowing likes, shares and commenting as per social media platforms like YouTube) leads to better outcomes for students (Buzetto-More, 2015).

Whatever the explanation, our review and proof-of-concept test show that there are definite differences in the ways that audiences from high context and low context cultural backgrounds react to the type of storytelling used in online videos about factual subjects like the sciences and social

sciences and, most concerningly, how well they can recall the communicated information afterwards. We suggest strongly that not only is more research in this area warranted, but it is also absolutely necessary – otherwise inequities in educational and learning outcomes for people of different cultural backgrounds are likely to persist.

There are also important implications for the use of storytelling in science communication generally. High-context and low-context cultural preferences are key elements of

cross-culture differences (Xia et al., 2021), suggesting that stories and storytelling need to be re-imagined within new geographies and cultural frames (Cameron, 2012). A new approach to storytelling for science communication is needed, a form of cultural science communication, that uses storytelling as a means by which different cultures create, assimilate, and communicate knowledge (Hartley, 2015). Without such a new model for telling science stories, we risk devaluing the effectiveness of science communication and restricting access to knowledge about science for large parts of the world's population. ☺

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#### REFERENCES

- Adedoyin, O. B., & Soykan, E. (2020). Covid-19 pandemic and online learning: The challenges and opportunities. *Interactive Learning Environments*, 31(2), 863–875. <https://doi.org/10.1080/10494820.2020.1813180>
- Adnan, H., & Redzuan, F. (2016). *Evaluating students' emotional response in video-based learning using Kansei Engineering* [Paper presentation]. 4th International Conference on User Science and Engineering (i-USEr).

- Bair, M. A., Bair, D. E., Niu-Cooper, R., & Diarrassouba, N. (2022). Border crossings: The role of narrative storytelling in the professional identity development of faculty of color. *College Teaching*. <https://doi.org/10.1080/87567555.2022.2093323>
- Buzzetto-More, N. (2015). Student attitudes towards the integration of YouTube in online, hybrid, and web-assisted courses: An examination of the impact of course modality on perception. *Journal of Online Learning and Teaching*, 11(1), 55.
- Cameron, E. (2012). New geographies of story and storytelling. *Progress in Human Geography*, 36(5), 573–592. <https://doi.org/10.1177/0309132511435000>
- Chen, C.-M., & Wang, H.-P. (2011). Using emotion recognition technology to assess the effects of different multimedia materials on learning emotion and performance. *Library & Information Science Research*, 33(3), 244–255. <https://doi.org/10.1016/j.lisr.2010.09.010>
- Collins, S. N., Steele, T., & Nelson, M. (2023). Storytelling as pedagogy: The power of chemistry stories as a tool for classroom engagement. *Journal of Chemical Education*, 100(7), 2664–2672. <https://doi.org/10.1021/acs.jchemed.3c00008>
- Davis, L. S., & León, B. (2018). New and old narratives: Changing narratives of science documentary in the digital environment. In B. León & M. Bourk, *Communicating science and technology through online video: researching a new media phenomenon* (pp. 55–63). Routledge. <https://doi.org/10.4324/9781351054584-5>
- Davis, L. S., León, B., Bourk, M. J., & Finkler, W. (2020). Transformation of the media landscape: Infotainment versus expository narrations for communicating science in online videos. *Public Understanding of Science*, 29(7), 688–701. <https://doi.org/10.1177/0963662520945136>
- Davis, L. S., León, B., Bourk, M., Zhu, L., & Finkler, W. (2022). Infotainment may increase engagement with science but it can decrease perceptions of seriousness. *Sustainability*, 14(17), 10659. <https://doi.org/10.3390/su141710659>
- Dunn, T. M., & Cherup, S. (2021). Storytelling and success: How storytelling can be used to promote diversity, cross-cultural understanding, and confidence in the classroom. *Journal of Education*, 203(3), 690–699. <https://doi.org/10.1177/00220574211032309>
- Finkler, W., & León, B. (2019). The power of storytelling and video: a visual rhetoric for science communication. *Journal of Science Communication*, 18(05), A02. <https://doi.org/10.22323/2.18050202>
- García-Avilés, J. A., & de Lara, A. (2018). An overview of science online video. In *Communicating science and technology through online video* (pp. 15–27). Routledge. <https://doi.org/10.4324/9781351054584-2>
- Green, J. K., Burrow, M., & Carvalho, L. (2020). Designing for transition: Supporting teachers and students cope with emergency remote education. *Postdigital Science and Education*, 2(3), 906–922. <https://doi.org/10.1007/s42438-020-00185-6>
- Grogan, J., Hollinsworth, D., & Carter, J. L. (2021). Using videoed stories to convey Indigenous ‘Voices’ in Indigenous Studies. *The Australian Journal of Indigenous Education*, 50(1), 38–46. <https://doi.org/10.1017/jjie.2019.15>
- Hajhosseini, M., Zandi, S., Shabanan, S. H., & Madani, Y. (2016). Critical thinking and social interaction in active learning: A conceptual analysis of class discussion from Iranian students’ perspective. *Cogent Education*, 3(1), 1175051. <https://doi.org/10.1080/2331186x.2016.1175051>
- Hall, E. T. (1976). *Beyond culture*. Anchor Press.
- Hartley, J. (2015). Stories tell us? Political narrative, memes, and the transmission of knowledge through culture. *Communication Research and Practice*, 1(1), 5–31. <https://doi.org/10.1080/22041451.2015.1042424>
- Hornikx, J., & Le Pair, R. (2017). The influence of High-/Low-Context culture on perceived Ad complexity and liking. *Journal of Global Marketing*, 30(4), 228–237. <https://doi.org/10.1080/08911762.2017.1296985>
- Joubert, M., Davis, L. S., & Metcalfe, J. (2019). Storytelling: The soul of science communication. *Journal of Science Communication*, 18(05), E. <https://doi.org/10.22323/2.18050501>
- Kim, D., Pan, Y., & Park, H. S. (1998). High- versus low-Context culture: A comparison of Chinese, Korean, and American cultures. *Psychology & Marketing*, 15(6), 507–521. [https://doi.org/10.1002/\(SICI\)1520-6793\(199809\)15:6<507::AID-MAR2>3.0.CO;2-A](https://doi.org/10.1002/(SICI)1520-6793(199809)15:6<507::AID-MAR2>3.0.CO;2-A)
- Lamsal, H. L. (2022). Exploring challenges and opportunities of Remote Teaching at Nepalese Community Secondary Schools during Covid-19 Pandemic. *Utamax, Journal of Ultimate Research and Trends in Education* 4(1), 29–38. <https://doi.org/10.31849/utamax.v4i1.7794>
- León, B., & Bourk, M. (2018). *Communicating science and technology through online video: Researching a new media phenomenon*. Routledge. <https://doi.org/10.4324/9781351054584>
- Milani, M. (2008). Cultural impact on online education quality perception. *Electronic Journal of e-Learning*, 6(2), 149–160. <http://files.eric.ed.gov/fulltext/EJ1098727.pdf>
- Praveena Daya A., Premapriya, G., Anithasri, A., & Karthikeyan, G. A. (2022). A comparative study of perception of online teaching versus traditional teaching among MBBS students during COVID crisis. *Journal of Communicable Diseases*, 3–8. <https://doi.org/10.24321/0019.5138.202201>
- Richardson, R. M., & Smith, S. W. (2007). The influence of high/low-context culture and power distance on choice of communication media: Students’ media choice to communicate with Professors in Japan and America. *International Journal of Intercultural Relations*, 31(4), 479–501. <https://doi.org/10.1016/j.ijintrel.2007.01.002>
- Sherer, P. D., & Shea, T. (2011). Using online video to support student learning and engagement. *College Teaching*, 59(2), 56–59. <https://doi.org/10.1080/87567555.2010.511313>
- Smith, M., Finkler, W., & Aitken, R. (2023). Connecting people with science: A proof-of-concept study to evaluate action-based storytelling for science communication. *Sustainability*, 15(15), 11655. <https://doi.org/10.3390/su151511655>
- Taskiran, A. (2022). Effective, efficient, and attractive instructional design for online learning. In *Handbook of research on managing and designing online courses in synchronous and asynchronous environments* (pp. 140–158). IGI Global.
- Usunier, J., & Roulin, N. (2010). The influence of High- and Low-Context communication styles on the design, content, and language of business-to-business web sites. *Journal of Business Communication*, 47(2), 189–227. <https://doi.org/10.1177/0021943610364526>
- Vedder, K. (2015). *Corporate Storytelling in two distinctive cultures: The presence of emotional and rational appeals in corporate stories on corporate websites of Spanish and British organizations* [Master’s thesis, Radboud University].
- Walan, S., & Enochsson, A. (2019). The potential of using a combination of storytelling and drama, when teaching young children science. *European Early Childhood Education Research Journal*, 27(6), 821–836. <https://doi.org/10.1080/1350293x.2019.1678923>
- Xia, W., Sun, B., & Zhang, Z. (2021). Correlation analysis between cultural context level and education/culture/geography/society-related parameters in twenty-six countries. *ICDTE '21: Proceedings of the 5th International Conference on Digital Technology in Education*, 170–175. <https://doi.org/10.1145/3488466.3488496>
- Yang, D., Sinha, T., Adamson, D., & Rosé, C. P. (2013). *Turn on, tune in, drop out: Anticipating student dropouts in massive open online courses*. [Paper presentation] NIPS Workshop on Data Driven Education.
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