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Sustainability Leadership For The Energy Transition: A Case Study Of Role-Playing To Enhance Authentic Learning

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SUSTAINABILITY LEADERSHIP FOR THE ENERGY TRANSITION: A CASE STUDY OF ROLE-PLAYING TO ENHANCE AUTHENTIC LEARNING

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ABSTRACT

To lead the energy transition, effective sustainability leadership requires a spectrum of skills, knowledge and understanding across technical, financial and even political disciplines. An innovative, authentic learning initiative has been designed and implemented in which Master of Sustainable Energy students conducted team-based role-playing activities, responding to a realistic, hypothetical energy policy scenario in the form of a government announcement and other mock collateral. Groups were assigned the personas of a range of industry stakeholders and prepared presentations (and accompanying media statements and position papers) for a mock online media conference. The initiative leveraged the diversity of the cohort, enabling constructive interactions and an appreciation of the impacts of energy policy on a variety of organisations and wider society. Entry and exit surveys affirmed that participants gained a deeper understanding of key issues, constraints, alternative views and approaches involved in navigating the policy pathways to sustainability. The teaching staff also observed a high level of student engagement. Challenges of group dynamics and teaching effort were felt to be outweighed by the benefits reaped by students, particularly in terms of deeper conceptual knowledge and an understanding of perspectives in the energy transition. The case study also found that the online nature of the media conference enhanced student innovation and engagement. The framework of the case study may nudge other educators towards greater use of role-playing activities in sustainability leadership pedagogy.

1 INTRODUCTION

1.1 Sustainability Leadership in the Energy Transition

The transition to sustainable energy, as part of a global net-zero carbon future, can be characterized as a "wicked" issue, involving both conflicts and conciliation. Motivated and diverse leaders are required, adept in their ability to analyse, at disparate scales, the trade-offs between energy security, equity and sustainability. In this setting, a distinctive theory and practice of sustainability leadership has emerged (Shriberg and MacDonald 2013) This represents a more inclusive, balanced, and deliberate process of influence that aims to deliver direction, alignment, and commitment to address social, environmental, and economic issues (Bickley et al. 2013). The principles of sustainability leadership highlight the importance of cross-boundary networks and engagement with stakeholder perspectives, as well as systems thinking and facilitation skills to respond to complexity (Allen et al. 2014). Teaching these skills to new sustainability leaders who are involved in the energy transition requires innovative higher education pedagogies (Beagon et al. 2021) with a focus on authenticity and multiple perspectives.

1.2 Authentic Learning and the Use of Role-Play

Higher education curricula with a focus on sustainability leadership show a strong prevalence of project-based learning and the facilitation of interactions between participants (MacDonald and Shriberg 2016). This is often based on authentic, experiential learning, where participants are involved in realistic simulations that can be integrated into practice (Boud and Prosser 2002), and contextualised against delivered content and lived experience (Bartle 2015). When this is combined with group work, constituted by people with diverse backgrounds, the cross-pollination of ideas and concepts yields even deeper perspectives. The rapidly shifting landscape of the energy sector and sustainability requires knowledge and adaptable skills which are well suited to this pedagogical approach. Experiential learning coupled with the practice of reflection can cultivate deep and lifelong learning that contributes to professional practices (Ayers et al. 2020).

Role-playing is an authentic pedagogical approach identified to have high relevance for developing sustainability-related competencies (Gordon and Thomas 2018), required by graduates leading the energy transition. However, several challenges are associated with using role-playing activities, including the time required to design and deliver scenarios that both reflect the real world and engage students (Gordon and Thomas 2018). There is sparse research on role-playing activities in online and hybrid teaching settings.

1.3 Objectives of this Paper

This paper outlines a case study of a role-playing activity and its effectiveness in enhancing sustainability leadership skills. The context of the study is a course on Energy Markets, Law and Policy within the Master of Sustainable Energy, a unique multi-disciplinary program offered by the School of Chemical Engineering at The

University of Queensland. The course is delivered synchronously to both internal (on campus) and external (online) students via an intensive teaching period, followed by course assessment, including the team-based role-playing activity, which was conducted entirely online. The role-playing activity is centred around a fictitious, but credible, policy scenario, with students acting as organisations and responding via authentic channels such as media conferences and position papers.

Through anecdotal observations and longitudinal student surveys, the paper evaluates the efficacy of role-play across the dimensions of knowledge transfer, appreciation of complexity, competency to set energy policy, and consultative approach to stakeholder perspectives. The results of the case study show that the role-playing activity is very well received by students, encourages active participation and has been successful in upskilling in some of the key elements of sustainability leadership. The paper also reflects on the teaching effort required to coordinate the online activity, along with its challenges and opportunities, and provides some recommendations on its place in engineering education for sustainability.

2 METHODOLOGY

2.1 Role-Playing Activity Design and Implementation

Figure 1 presents how the program was conducted. Prior to the role-playing activity, students participated in lectures and workshops in an intensive format. In one lecture, external presenters delivered industry insights to their approach to energy policy. Students were assigned to groups by the teaching staff, with the diversity of team members being a key consideration. Each group was then assigned the persona of a distinct Australian organisation that is impacted by energy policy. They included an electricity generator, a hydrogen startup, a low-income advocacy organisation, a vertically integrated energy retailer and a think tank.

Students were provided with substantial collateral to explain the policy initiatives. The teaching staff invested substantial effort to produce mock content which replicated the format and limitations of real-world policy delivery. This included a short video announcement from the Prime Minister, a regulator's website, a branded capital raising prospectus and a ministerial press release. The materials had a consistent core message, but akin to real-world communications, the collateral contained gaps, inconsistencies and flaws. Together, the materials conveyed a hypothetical policy position to be adopted by the Australian government, which would have implications across the economy for investors, energy market participants, consumers and industry.

Groups were tasked to arrive at a position that supported the interests of their assigned organisation and stakeholders. The task required interpretation, analysis and persuasive response, conducted with an emphasis on leadership, teamwork and communication. Critically, the role-playing activity was held entirely online, via Zoom with all students present for the entirety of the activity. This facilitated a multi-perspective approach aimed at enhancing students' sustainability leadership skills.

The role-play framework provided the scenarios for presentations and written content which constituted 50% of the students' total course marks, with an expectation that each student would contribute about 45 hours of work, although this was not monitored. Student submissions were generally of very high quality, reflecting the high engagement of the cohort and the competitive nature of group work, with some submissions exceeding teaching staff's expectations. Group deliverables were submitted two weeks after the intensive learning modules:

- A realistic, branded one-page media statement, submitted online before the presentation, and available to be read by all students.
- Submission of written well-formulated, tailored questions for each group, prepared as journalists.
- A 5-minute group presentation set in the style of an online media conference.
- A 5-10 minute response to questions.

In addition, two weeks after the media presentations, groups were required to submit a comprehensive Position Paper that further articulated organisational positions, and reflected on learnings from the presentations.

Non-presenting groups acted as the audience, role-playing as journalists attending the media conference, asking questions curated by the teaching staff. Later, groups were required to submit a position paper providing further details of the organisation's response to the policy announcement.

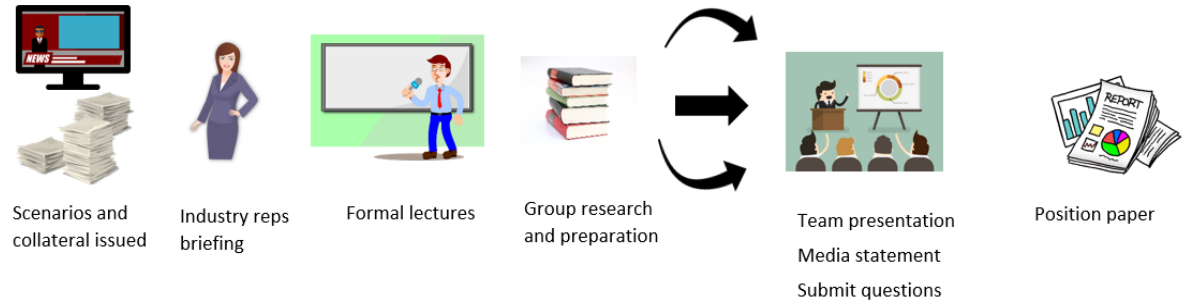

Figure 1: Learning initiative workflow

The primary learning objective of the role-playing initiative was to contextualize the core content of energy markets and policy. Secondly, students were trained in leadership through position development, team management and persuasive argument. And finally, students were afforded the opportunity to appreciate policy from alternative stakeholder perspectives. In the media presentations, groups were assessed using a marking rubric that covered all the deliverable outlined above. The Position Paper was also assessed, with further criteria on articulation of vision and references. To score well in the assessment items, a group's position required the appropriate use of facts, frameworks and underlying theories developed in the course. Groups were at liberty to agree or disagree with the proposed policies, or offer alternative policies and recommend methods for policy implementations.

2.2 Assessing Effectiveness of Learning Initiative

Direct observation, anecdotal feedback and survey instruments were used to establish if the role-playing activity enhanced sustainability leadership skills and achieved the objectives detailed in section 2.1. Positive attributes associated with experiential learning using role-playing (Boud and Prosser 2002) form qualitative and quantitative ways of measuring success.

Specifically, the assessment aimed to establish:

- Were competencies improved in sustainability knowledge and leadership?
- Did students' views about energy policy change as a result of the initiative?
- Did the initiative heighten students' engagement in the material?
- Did students value the role-playing and teamwork aspects of the activity?
- Was the learning experience compromised or enhanced by assigning students to role-play as organisations where sustainability values conflicted?

In order to assess the efficacy of the role-playing approach and to assess alignment with the project objectives, a longitudinal research approach was employed:

- A pre-course "entry" survey on content knowledge, attitudes to energy policy and leadership, using a 5-point Likert scale.
- A post-course "exit" survey consisting of the same questions, plus questions to understand changes in views, teamwork perspectives and values alignment.
- Anecdotal feedback from students and teaching staff.

Summary statistics from survey responses were derived to establish the degree to which students perceived that the learning objectives were met. A *t*-test was performed to determine the significance of changes in perceived competency upon entry and exit. Results were also segmented to determine if the cohort responded differently depending on domestic/international or full-time/part-time status. ANalysis Of VAriance was applied to establish if the survey responses were influenced by the ethical alignment between students and their organisation.

The surveys followed ethics protocols established by the Faculty of Engineering, Architecture and Information Technology at The University of Queensland. Participation in the surveys was voluntary, with clear information presented at the beginning of each survey explaining its purpose, the non-identifiable nature of any data/responses gathered and the right to withdraw from the project. The survey sought explicit consent from participants to use their data/responses for this research project. From a cohort of 60 students in 2022, 41 consenting responses were received to the pre-course survey and 31 to the post-course survey.

3 RESULTS

3.1 Student Survey Results

Content Knowledge, Attitudes to Energy Policy and Leadership

The student entry and exit surveys (Table 1) showed that the role-playing activity facilitated a vast improvement in energy policy content knowledge (Q1 - Q4). Sustainability leadership was manifest in increased confidence in 'knowing what to do' (Q6). All results were significant at the 95% level of confidence. There were no significant differences across domestic/international students or by full/part time.

Table 1. Student entry and exit surveys: self-assessment on knowledge and attitudes

(Entry N= 41), (Exit N=31). Scale 1 = Very Low to 5 = Very High	**MEAN ENTRY**	**MEAN EXIT**	**MEAN Change**
Q1. I judge my level of understanding on energy policy to be.	2.88	3.94	1.06
Q2. I know the aims of government energy policy in my jurisdiction.	3.02	3.97	0.94
Q3. I know how the government practically implements energy policy in my jurisdiction.	2.78	3.94	1.15
Q4. I understand how energy policy affects different parts of business/society	3.33	4.10	0.77
Q5. I can interpret energy policy announcements in my jurisdiction	3.10	4.13	1.03
Q6. If I personally held the responsibility to set energy policy in my jurisdiction, I would know what to do	2.51	3.74	1.23

Changes in Views

The exit survey asked students to quantify the extent to which their views on energy policy and regulation shifted as a result of their experiences during the course (Table 2). Students conveyed that the influence of energy policies extends to vastly more stakeholders in society (Q8), in a more complex manner (Q7), than they appreciated before the course.

Interestingly, responses were mixed on whether collaborative or authoritative energy policy approaches were better (Q9), with a bimodal distribution. The mean across *domestic* respondents for Q9 was 2.47 (indicating a shift to preferring more collaboration) while *international* students returned 3.47 (indicating a shift to a more authoritative approach), being a significant distinction at 95% confidence. This highlights the potential influence of culture, values and familiar government systems in forming views.

Table 2. Student exit survey: self-assessment on change in views through course

(N=31). Scale: 1 = Very Low to 5 = Very High	**MEAN**	**Stdev**
Q7. Compared to my views at the beginning of the course, I believe Energy Policy issues are less or more complex?	3.94	1.15
Q8. Compared to my views at the beginning of the course, I believe Energy Policy affects fewer/more stakeholders in society?	4.42	0.62

Q9. Compared to my views at the beginning of the course, I believe Energy Policy requires a more collaborative (1) or more authoritative (5) approach?	2.90	1.35

Teamwork and Role-Play

Exit surveys revealed the value that students placed on the role-playing and teamwork nature of the design (Table 3). The *effectiveness* response (Q10) indicates that students themselves discerned that engagement was elevated as a consequence of role-playing. The *importance* response (Q11) revealed that students recognised that the format of the initiative helped them to absorb content and acquire skills.

Table 3. Student exit survey: self-assessment on the importance of teamwork and role-play

(N=31). Scale: 1 = Very Low to 5 = Very High	**MEAN**	**Stdev**
Q10. How effective was role-playing as a learning approach to Energy Policy in this course?	4.16	0.73
Q11. How important was group work and role-playing to your learning outcomes in this course?	4.03	0.98

Values and Industry Involvement

Students were surveyed on exit to establish the degree of alignment between their personal values and the organisations that they role-played (Table 4). The positions and solutions that the groups promoted in role-play were generally aligned with their personal values (Q12), despite the fact that organisations included fossil fuel industry bodies and thermal electricity generators. The responses to Q12 and Q13 provided encouraging feedback that the emerging cohort of professionals is able to balance perspectives, including the roles of existing industrial stakeholders, as part of a sustainable energy future.

Responses to Q12 allowed us to investigate whether student engagement or other responses were systematically *lower* if students found themselves associated with an organisation whose values *disagreed* with their own. Application of ANOVA revealed there was *no evidence* of such dependence.

Responses to Q14 showed strong evidence that students would value ongoing access to a representative of their nominated organisation to guide decisions and interpretations. Our pedagogical design contemplated this feature, but for pragmatic and student equity reasons it was not instituted: it remains a possible learning enhancement in future.

Table 4. Student exit survey: self-assessment on values and industry involvement

(N = 31). Scale: 1 = Very Low to 5 = Very High	**MEAN**	**Stdev**
Q12. My personal values aligned with those of my assigned organisation/company	3.87	0.81

Q13. The position my group developed is an appropriate response for my assigned organisation/company.	4.35	0.75
Q14. How would you feel about the group project if there was a representative from the actual organisation available to answer some of your questions?	4.42	0.72

3.2 Student Anecdotal Review

Respondents offered free-text feedback on the exit survey and three main themes emerged (Table 5). Students verbally commented that the role-play was "a fun way to learn", which was observed by the teaching staff, and supporting our assertions on student engagement.

Table 5. Student exit survey: Free text response examples

Theme	**Example Comment**
The role-playing format was an effective and engaging way to learn about energy policy.	*Role-play was an engaging and interesting method to discuss policy issues.*
Teamwork was a successful approach for sounding ideas and consolidating concepts.	*About the group presentation and role-play, it is a fantastic idea to engage the people with the Energy Policy. This is always a challenge because of the tough topic, and energy policy is not easy to digest and understand all the potential impacts that it could have.*
Viewing the presentations and preparing questions for other groups enabled an understanding of policy from different perspectives.	*It was good to put yourself in the company shoes then have to put yourself as a journalist to then think about questions and how the same policies affect other businesses.*

3.3 Reflections and Experiences of Project Designers

The teaching staff observed that the role-playing approach and relevance to real-world issues led to high student engagement and universal participation, which aided the teaching process. Deliverables were on par with professional standards, and the Zoom format allowed students to add flourishes, including costumes, microphone props, fake names, branding and background logos during their role-play.

Our assertions that students successfully contextualised sustainability leadership theory was based on the sophistication of responses formulated by students in presentations, both prepared and impromptu, and the way that reflections were weaved into the position papers.

Peer-based learning manifested through skills and knowledge sharing in group work, particularly supporting the less-prepared students. Group interactions reduced the volume of direct queries to the teaching staff.

However, some students provided feedback that the workload was burdensome, with high expectations. Group dynamics is always difficult in university environments, and some team disagreements were only resolved through intervention and alternative

assessment paths. While disparate views added value in some groups, it could also result in irreconcilable conflict, presenting a microcosm of real-world climate politics.

Preparing the scenarios, collateral, managing groups and hosting role-play forums all add to the teaching workload. However, given the benefits to students and the positive outcomes it was felt that the initiative was worthwhile. Alternative ways of industry engagement have been documented (Thomson et al., 2021), but the balance between benefits and administrative burden is delicate.

4 DISCUSSION

Consistent with the finding of others (e.g., Gordon and Thomas, 2018), the authentic learning has proven successful as an initiative to enhance learning outcomes in sustainability leadership. The delivery model elevates student engagement, and role-playing itself acts as a training device to introduce skills such as presentation, communication and persuasive argument. The role-playing experience with authentic scenarios enables students to contextualise lived experience, contemporary current affairs and other course knowledge (Bartle, 2015).

Surveys measuring perceived competence illustrated a significant improvement in the cohort's energy policy knowledge and sustainability leadership. It is conceivable that content could still be reinforced with traditional delivery methods, but perhaps student engagement would be reduced, fewer conceptual connections would be made with the rest of the program, and real-world stakeholder perspectives would not be appreciated to the same extent.

The diverse organisations in the role-play exposed students to the vast complexity of the energy transition challenge. Entry and exit survey results confirmed significant changes in student views. Group work needs careful curating (Zou et al. 2012) and it was found some teams were unable to find conciliatory positions. Survey evidence suggests that ideological biases may be a contributing factor to group-work failure but longitudinal studies (Zou et al. 2012) suggest other pitfalls such as social loafing. Other teaching initiatives to foster teamwork (Azizan et al. 2018) have also found success as part of student-centred cooperative learning strategies.

It is worth reflecting on the limitations of role-playing. The tool simplifies complex sustainability challenges and decision-making, potentially affecting authenticity and the transferability of skills and knowledge (Kioupi et al. 2019). Role-playing activity that is executed poorly can be uncomfortable and emotionally overwhelming for some learners (Gordon and Thomas 2018) and can lead to scripted outcomes that reduce critical thinking. This study did not find any evidence of these issues, but the activity did benefit from well-prepared, realistic scenarios and collateral; a mature postgraduate cohort; and a mixed-methods approach to teaching and assessment.

Educators may encounter challenges integrating industry involvement in educational programs (Thomson et al. 2021). In this activity, it was found that corporations were protective of branding and reputation. When socialised, realistic student submissions

were required to have watermarks and de-branding to ensure that they were not confused with actual corporate publications.

5 CONCLUSION

The generation of sustainability leaders who are presently emerging to guide the global energy transition has an enormous task ahead of them. To equip them only with technical and economic skills is doing a disservice to individuals operating in a highly cross-disciplinary field. This study has determined that role-playing delivers an authentic learning experience that successfully immerses students in energy policy, markets and regulations, and enables understanding and deep conceptual connections with other fields of sustainability. Importantly, the case study has shown that a multi-perspective approach can be delivered online efficiently, with high levels of student engagement and a high degree of authenticity.

While the initiative delivered successful learning outcomes, avenues for improvement have been identified. However, reflections suggest that enhancement of the resources and facilitation need to be balanced against the additional time and effort required. Future research could focus on addressing challenges including inclusivity and critical thinking, to maximise role-playing effectiveness in sustainability leadership education.

There are two main contributions emanating from our work. Firstly, the dissemination of this case study may contribute to greater consideration of the use of role-play as a rich and authentic learning experience in higher education. By documenting the approach of this case study and addressing the common perceptions of challenges and effort, the paper provides some insights to guide future educators.

Secondly, our implementation has documented the use of role-playing activities in an increasingly online, and/or hybrid learning environment. In the case study presented, the activity flourished across a student body constituted by teams who conducted group work in a hybrid format, including online sessions. While the role-playing activity itself was performed entirely online, no technical issues were encountered but some unexpected benefits were reaped in student engagement offered by the Zoom platform.

Together, these contributions may enhance the discussion on opportunities for planning and running role-play as a valuable activity for higher education in sustainability leadership. Indeed, the pedagogical approach and the assessment frameworks could be used by others to assist with more widespread implementation of this worthwhile activity.

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