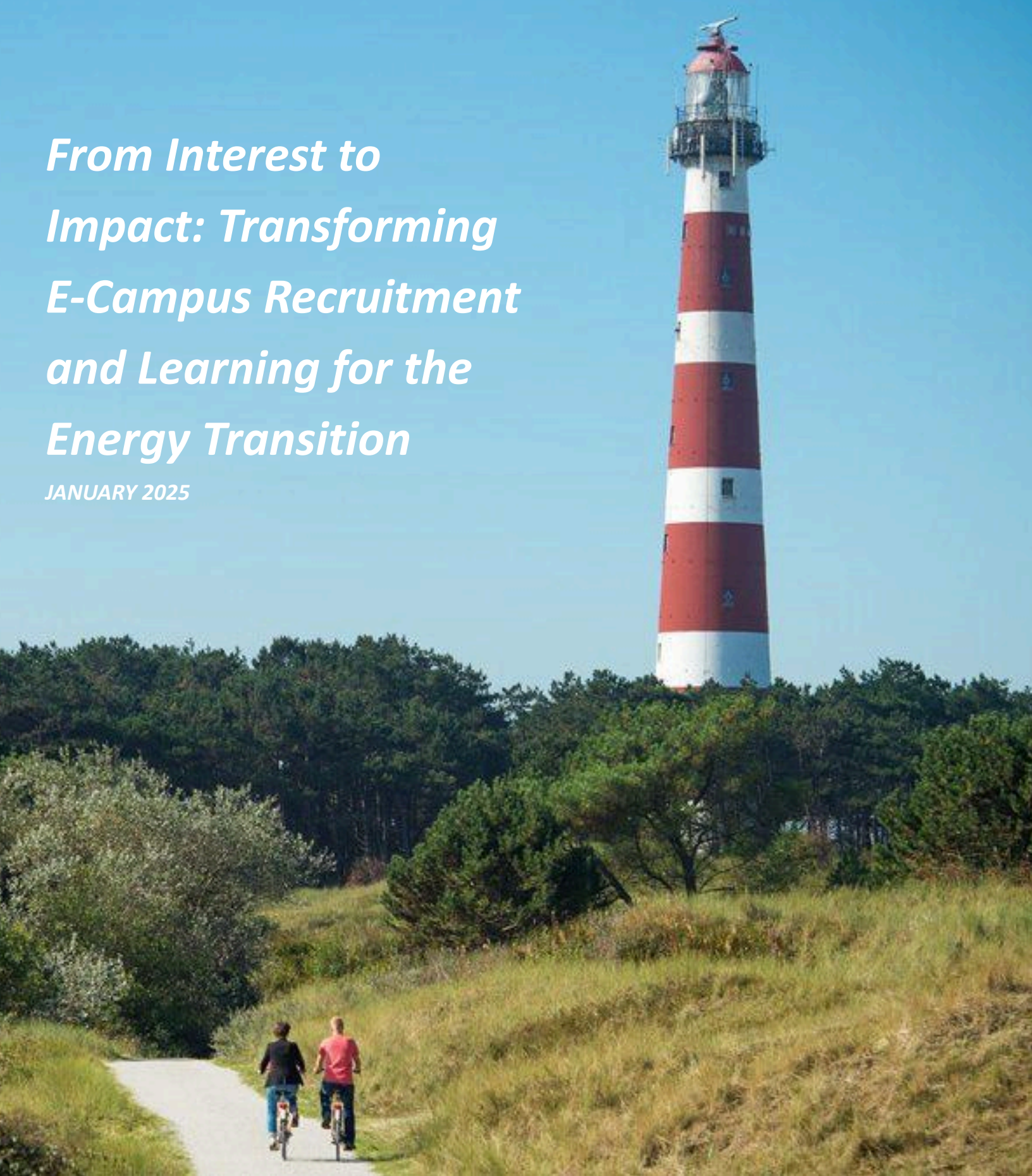


*From Interest to
Impact: Transforming
E-Campus Recruitment
and Learning for the
Energy Transition*

JANUARY 2025



From Interest to Impact: Transforming E-Campus Recruitment and Learning for the Energy Transition
Research Report

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List of Abbreviations

Abbreviation	Full Name
BBL	Beroeps Begeleidende Leerweg (vocational guidance pathway or apprenticeship)
ET	Energy Transition
EU	European Union
HBO	Hoger Beroepsonderwijs (higher vocational education)
LHF	Learning Hub Friesland
MBO	Middelbaar Beroepsonderwijs (secondary vocational education)
NEC	New Energy Coalition
NESSIE	New Skills & Spaces Impulse for the Education of Aspirant Energy-Transition Installers
SCCT	Social Cognitive Career Theory
SLB	Studieloopbaanbegeleider (study career counsellor)
STEM	Science, technology, engineering and mathematics
SVT	Schwartz's Value Theory
VMBO	Vorbereidend Middelbaar Beroepsonderwijs (preparatory secondary vocational education)
VET	Vocational Education Training
WO	Wetenschappelijk Onderwijs (scientific or university education)

Abstract

The European Green Deal aims to achieve carbon neutrality by 2050, creating millions of green jobs in the process and ensuring a sustainable future. Critical to achieving this goal is addressing the shortage of skilled energy transition (ET) technicians. The EU-funded NESSIE Project seeks to address this gap by developing and implementing innovative recruitment campaigns and creating engaging and inspiring learning environments across four pilot locations in the North Sea region. This study integrates Social Cognitive Career Theory and Situated Learning Theory to provide practical recommendations for improving the NESSIE project's recruitment and engagement efforts. Through focus groups and expert interviews, we explore effective ways to encourage young people, particularly women and vocational students, to pursue careers in the ET field. Our research identifies a number of barriers in current recruitment approaches, including challenges related to gender dynamics and communications, while identifying opportunities to improve collaborative learning environments. The findings provide actionable recommendations for developing more effective outreach campaigns and fostering engaging learning environments. Ultimately, this research bridges the awareness gap surrounding green jobs and supports the EU's broader goal of fostering sustainable career pathways in the energy transition sector.

Key words: European Green Deal, energy transition, green jobs, recruitment, gender, learning environment, social cognitive career theory, situated learning theory.

1. Introduction

The European Green Deal outlines a transformative strategy to transition the European Union to a resource efficient, competitive, and net-zero economy by 2050. The Green Deal serves to ensure equitable economic growth and a *Just Transition* following the mantra of 'no person and no place left behind' (The European Green Deal, 2021b). This will generate an estimated 11 million jobs, with a net gain of 5 million jobs in the energy transition sector (McKinsey & Company, 2020). In order to achieve this job growth, it is necessary to create a pipeline of workers that are well trained including reskilling current technicians, but more so preparing the next generation of workers for energy transition installers (Simon et al., 2020). In order to reach the ambitious goals of the EU Green Deal, funding is allocated to the NESSIE project (New Skills & Spaces Impulse for the Education of aspirant energy-transition installers) which is a proactive EU-funded initiative aimed at partially addressing the critical need for skilled Energy Transition (ET) technicians. Coordinated by Learning Hub Friesland, NESSIE aims to employ unconventional recruitment campaigns to attract students and career changers. Its goal is to obtain 1,000 new certified ET graduates and upskill existing employees through innovative educational approaches, over its duration from January 2024 to January 2027. E-campus will serve as the central hubs for these efforts, with pilot locations established in Samsø (Denmark), Borkum (Germany), Ameland (Netherlands), and Morbihan (France).

A key challenge for vocational education programs is to shift the perception around going to university and getting a degree as the only viable option for a career path, which has been the standard for years (World Economic Forum, 2023). Particularly, efforts should be made to promote skilled trades as viable and desirable alternatives to university degrees. Furthermore, whilst younger generations understand the urgency of the

climate crisis, as it is an existential threat that they were born into, many young people lack awareness of the diverse green job opportunities available. Research shows that although 71% of Generation Z respondents express interest in jobs that benefit the planet, only 40% consider technical careers such as installing renewable technologies (MCS Charitable Foundation, 2023). This disconnect reflects a gap not in motivation but in awareness, highlighting the need for targeted recruitment efforts to bridge this divide. There is a clear need for education providers to be a connector to young people for this career advice. They could do so by meeting them where they're at, provide choices and training paths, and increase awareness of the many opportunities that can be found in this growing field (MCS Charitable Foundation, 2023; World Economic Forum, 2023).

As the NESSIE project nears the end of its first year, we have identified a gap in existing research and strategies regarding how to best reach young people interested in pursuing a career in the energy sector. Given the urgent need for trained ET technicians, this project therefore aims to strengthen the recruitment capabilities of the NESSIE project by providing research-informed recommendations for the recruitment and engagement of prospective students interested in a career in the energy transition. Therefore, the goals of this project are twofold; firstly to provide concrete recommendations about how to tailor recruitment campaigns to recruit and engage prospective students; and secondly by improving student engagement and learning environments with suggestions for how to strengthen programs offered in the four pilot locations. The central question and subquestions guiding our research are:

1. How can NESSIE E-campuses across pilot locations effectively recruit and engage prospective students, fostering their interest in acquiring technical skills and pursuing careers in energy transition?
 - a. What recruitment strategies can attract underrepresented student groups, such as women and vocational education and training (VET) students?
 - b. How can E-campuses improve engagement within learning environments that motivate students to pursue careers as energy transition technicians and engineers?

These questions will be explored through focus groups with VET students and young women, supplemented with data from expert interviews and informal observation. By addressing the gaps in awareness and engagement, the NESSIE project can play a critical role in preparing the next generation of ET professionals and workforce needed to achieve the EU Green Deal's goals.

2. Underrepresented Groups: Challenge? Opportunity? Or Both?

Equality and inclusion are two core EU principles and fundamental rights that drive economic growth and social well-being. As energy policy also plays a role in economic growth and social well-being, it is essential to recognise the importance and benefits of diversity, equality, and inclusion in the European energy sector (European Commission, 2022). Furthermore, the majority of available jobs in the European energy sector are in traditional energy sources (European Commission, 2022). Thus in order to meet the goals of the EU Green Deal, efforts need to be made to increase the diversity of the workforce, by getting young people into renewables at all levels of education and training. Despite this, women and VET students face a number of barriers when entering the field.

Across all fields but STEM, women obtain bachelor degrees at a higher rate than their male counterparts (Conrad et al., 2021). However, men achieve STEM degrees at twice the rate of their female peers (Conrad et al., 2021). This discrepancy in higher education has an impact on the workforce. Across the EU, for example, women only make up 25% of the energy workforce, with the figure being marginally higher for senior positions (European Commission, 2024). Globally, this figure is slightly higher at 30% (UNESCO, 2019). Furthermore, women's involvement in research and innovation (R&I) stands only at 22% with a significant variation across the EU27 (EU Commission, 2024). Women pursuing careers in STEM face a number of barriers including social and cultural norms, gendered preferences for careers in STEM, and a lack of support and flexibility in the field (EU Commission, 2024).

Vocational students on the other hand, experience a negative stigma surrounding a perceived 'lower' level of education, with one fifth of students following a vocational education reported feeling looked down upon due to their studies (Aldossari, 2020; Aryeetey et al., 2011; Spruyt et al., 2015). When addressing the recruitment of vocational students, a major challenge lies in the stigmatization of vocational training that frames it as inferior to academic education. Students can be dissuaded from pursuing technical careers based on the fact that societal norms devalue practical professions (Aldossari, 2020; Aryeetey et al., 2011). This issue is compounded for girls and women, as they experience stigmatisation through both their gender identity and the social and cultural norms surrounding practical professions.

3. Theoretical Framework

3.1 Social Cognitive Career Theory

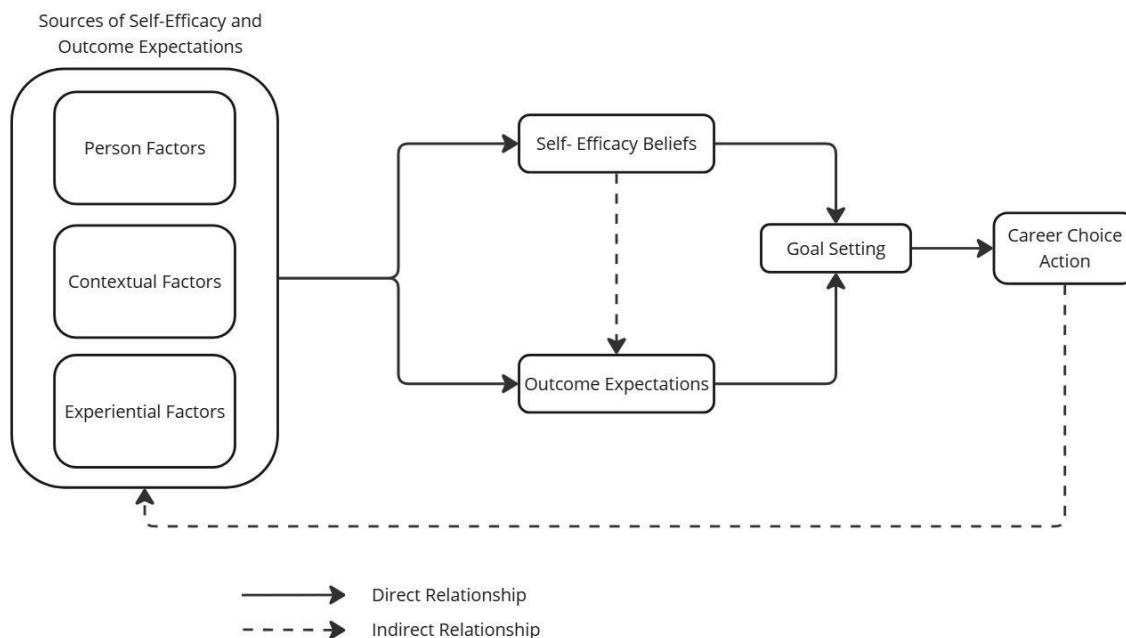
In order to explore how best to engage and recruit young women and vocational students to pursue a career in the ET, this study employs Social Cognitive Career Theory (SCCT) conceptualised by Lent, Brown, and Hackett (1994). SCCT provides a comprehensive model for exploring how personal, contextual, and experiential factors shape individuals' career development (Lent et al., 1994), and has been the theoretical framework for exploring factors contributing to underrepresentation within STEM (Fouad and Santana, 2017). SCCT emphasises self-efficacy, outcome expectations, and goals, and the role they play in the formation and development of academic and career interests. Through these three constructs, SCCT can provide insight into the processes guiding career decision-making and help inform targeted recruitment and engagement strategies for underrepresented groups in the ET. SCCT has been employed in a number of other studies to explore how career decisions are made by diverse groups including underrepresented groups in STEM (Fouad and Santana, 2017), women and racial minority students (Sellars, 2021; Inda et al., 2013; Mozahem, 2022), and students with disabilities (Appling et al., 2022).

Central to SCCT is self-efficacy, or an individual's belief in their ability to perform specific tasks or behaviours and is mediated through personal, contextual, and experiential factors (Bandura, 1986; Lent et al., 1994). In the context of this study, self-efficacy pertains to the target group's confidence in their ability to succeed in ET careers, with prior education experiences, exposure to technical careers, and visible role models influencing self-efficacy. Positive reinforcement from teachers during early education can enhance individual perceptions of capability in the discipline, whilst negative experiences or lack of support may discourage students from pursuing a career in the ET. Outcome expectations, or personal beliefs about likely outcomes, involve the

anticipated consequences of certain actions (Lent et al., 1994). Divided into three categories, outcome expectations explore the physical (e.g. financial rewards), social (e.g. approval from others), and self-evaluative (e.g. personal satisfaction) outcomes (Lent et al., 1994). Through understanding the outcome expectations of target groups, recruitment and engagement strategies can be better tailored to meet these expectations. In the context of this study, environmental and societal benefits of careers in the ET may serve as powerful motivators. Finally, goals are self-motivating and refer to the determination of individuals to engage in specific activities or to pursue a specific outcome (Lent et al., 1994). Goals are shaped by self-efficacy beliefs and outcome expectations, which further underscores the need to build confidence in target groups and highlight the tangible benefits of working in the ET sector.

Values play a critical role in shaping outcome expectations, as they influence what individuals perceive as important or desirable outcomes. To expand on values, we have drawn from Schwartz's theorising on universalism and self-enhancement values (Schwartz, 1994). In energy transition education, understanding how students' values shape their career choices is crucial. For instance, students valuing universalism may pursue energy transition careers for their global environmental and social impact, while those prioritizing self-enhancement may focus on career prospects and personal achievement (Schwartz, 1994). Recruitment strategies can be tailored to address these differing motivations by highlighting how careers in the energy transition align with diverse values, ultimately enhancing the attractiveness of the sector to underrepresented groups.

Figure 1. Social Cognitive Career Theory



Source: adapted by the authors from Lent et al. (1994).

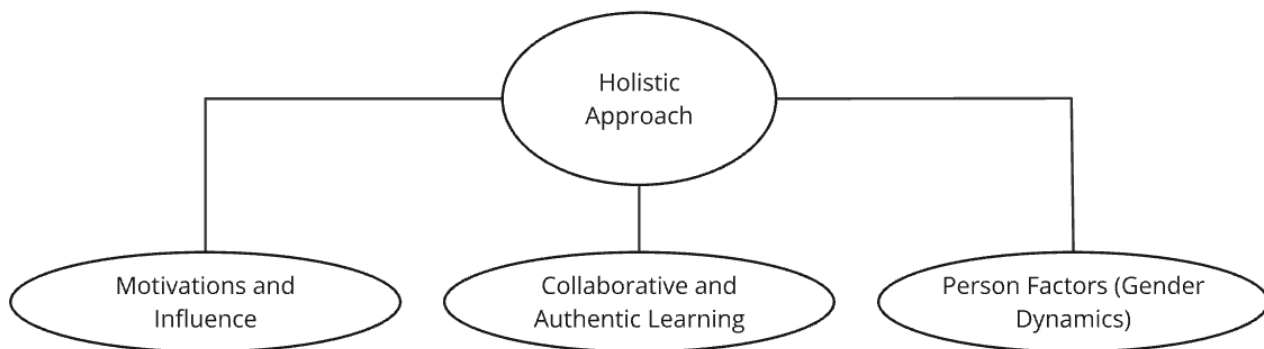
3.2 Situated Learning Theory

Situated Learning Theory (SLT) provides a comprehensive framework for understanding how learning occurs within authentic, real-world contexts by allowing learners to apply knowledge directly within relevant situations (Herrera, 2024). Learning occurs when individuals engage with and participate in the sociocultural practices of a community, progressing from peripheral involvement to full participation as they gain expertise. This process highlights the "learning by doing" approach, emphasizing that knowledge is constructed through interaction, practice, and reflection within authentic settings (Catalano, 2015). The environment in which learning takes place is central to SLT. Decontextualized instruction, such as abstract or isolated classroom learning, is ineffective for fostering deep understanding. Another key aspect of SLT highlights that novices (new learners) interact with experts (experienced practitioners) in a shared domain. This interaction facilitates the transfer of skills and knowledge through coaching, collaboration, and cognitive apprenticeship. Participation in these communities enables learners to gradually assume more central roles and responsibilities. SLT is particularly valuable in designing educational programs for energy transition fields. By situating learning within community-driven, real-world projects, such as renewable energy systems or climate solutions, students can directly engage with the challenges and practices of the sector.

3.3 Integrated Framework: A Holistic Approach to Student Recruitment and Engagement

Personal, contextual, and experiential factors significantly shape career development by influencing self-efficacy and outcome expectations. Mentorship and relatable outreach enhance access and opportunities, while barriers like gender stereotypes and stigmatized paths deter participation in ET education. Addressing these barriers with targeted interventions fosters inclusivity and broadens engagement. Embedding learning in real-world projects develops technical skills, promotes collaboration, drives innovation, and deepens sustainability understanding. Integrating these factors provides a nuanced perspective on recruitment and engagement outcomes (see Figure 2).

Figure 2. Recruiting and Engaging Underrepresented Groups: a Holistic Approach



Source: generated by authors

4. Methodology

This study utilised a qualitative research approach, with focus groups (FG) used as the primary data collection method, supplemented by a semi-structured expert interview. These methods were chosen to explore the

experiences, attitudes, and perceptions of students and other key stakeholders regarding energy transition training.

4.1 Focus Groups

Focus group methodology in qualitative research facilitates in-depth discussions among groups of four to eight participants, typically lasting 60 to 90 minutes (Krueger and Casey, 1988; Kitzinger, 1995; Hennink et al., 2020). FG sessions are moderated to encourage participants to share their experiences and viewpoints with one another, enabling a dynamic exchange of ideas and allowing researchers to collect a diverse range of opinions within a relatively short time frame (Hennink et al., 2020; Kitzinger, 1995; Morgan, 1997). Focus groups were chosen as the primary data collection method to explore how identified target groups could better be recruited, engaged, and motivated to pursue careers in the energy sector. By allowing the exploration of emerging or unclear issues (Hennink et al., 2020), FGs were particularly well-suited to the dynamic nature of the energy transition field. Additionally, they offered direct feedback on the effectiveness of recruitment and engagement strategies, encouraging diverse perspectives that contributed to a holistic understanding of the challenges and opportunities in recruitment (Kitzinger, 1995). Two FGs were conducted in November 2024, involving ten participants. These sessions not only highlighted key themes but also identified candidates for in-depth interviews, informing subsequent research phases. The focus groups primarily explored student experiences regarding their motivations, expectations, and engagement.

For this project, FG guides were developed and tailored to the needs of the identified target groups; young women and VET students ([Appendix 1 and 2](#)). Acknowledging the iterative nature of qualitative research, the guides were revised multiple times by the research team to ensure suitability and coherence. The FG guide was translated into Dutch by a team member and reviewed by two native speakers for clarity. Vignettes were incorporated into the FG guides as opening icebreakers and closing prompts to foster rapport and ease participants in or out of discussions. Vignettes, as described by Hughes and Huby (2002: 382), consist of “text, images or other forms of stimuli to which research participants are asked to respond.” Alternatively, they can be described as “short stories in written or pictorial form, intended to elicit responses to typical scenarios” (Hill, 1997). The vignettes were designed as short narratives (2–3 lines) that reflected common experiences and contrasting scenarios. Participants could listen to the vignettes read aloud or read them individually, with time allocated for individual reflection before group discussions began. As vignette methodology can perform differently in cross-cultural contexts, the vignettes for the Dutch-language group were reviewed for contextual and cultural suitability by a number of native speakers (Meyers et al., 2017). Notably, one vignette closely resembled a real-life situation, differing only in the participant's age.

4.2 Semi-Structured In-Depth Interviews

To complement the focus group data and address the institutional perspective, we intended to conduct semi-structured in-depth interviews with relevant stakeholders such as educators, student recruiters, and municipal representatives. The intended purpose of these interviews was to “fill in the gaps” identified during the FG discussions, providing a broader understanding of the challenges and strategies involved in recruiting and engaging students in the energy sector. Despite repeated outreach attempts, only one interview was completed. Regardless, the interview with an academic in an energy related program, offered valuable insights

into the institutional processes, motivations, and challenges, enriching the findings from the focus groups. The interview guide can be found in [Appendix 5](#).

4.3. Informal Observations

Informal observations were conducted during an open day at Firda Anna Wadmanwei and Stadionplein in Leeuwarden in late November. The purpose of this observation was to provide contextualising information into recruitment events and program dynamics, focusing particularly on gender, age, and those accompanying prospective students (predominantly parents).

5. Data Collection

5.1 Participant Recruitment

Research participants were recruited using a purposeful sampling approach to ensure representation from the identified target groups. In order to recruit participants for the focus groups, we first identified two primary target groups: young women and vocational students. Based on this, participant profiles were developed (see [Appendix 5](#)), and recruitment tailored to match the profiles. To recruit young women, the research team contacted two relevant education programmes, Masters Sustainable Energy System Management and Masters Renewable Energy at Groningen's Hanzehogeschool, a university of applied sciences, resulting in five participants. The participants for the second focus group were organised through the client and his connection to a Firda location in Leeuwarden, resulting in five participants. Notably, there were no women involved in the VET students focus group, with the coordinator acknowledging the gender disparity. He emphasized that for women in the program to succeed, they needed to "*stevig in je schoenen staan*" ("stand firm in your shoes"), suggesting that women must be strong and self-assured to thrive in such a male-dominated environment.

5.2 Ethical Considerations

When conducting focus groups and in-depth interviews, several ethical considerations were carefully addressed. Focus groups, in particular, posed challenges regarding confidentiality, anonymity, and voluntary participation (Hennink et al., 2020; Kitzinger, 1995). To address these issues, moderation was designed to maintain open dialogue while upholding ethical standards. Special attention was given to protecting participants' privacy in the group setting through the establishment of clear ground rules, which were explained and agreed to at the beginning of each session. Eight ground rules were developed to ensure a respectful and secure environment (see [Appendix 1-2](#)). Sessions were moderated to ensure adherence to these rules, with the facilitator stepping in when necessary to mediate discussions and maintain a supportive atmosphere. In the Dutch FG, the moderator had to intervene on two occasions to bring the discussion back on topic and take attention away from one participant. Participants were also reminded that their involvement was voluntary, and they retained the right to withdraw their consent at any time without consequence. Through moderation and implementation of the aforementioned ground rules, informed consent was obtained from all participants. Focus groups were held in neutral, comfortable locations, such as a workshop in Firda and a university meeting room at Zernike Campus, to foster open dialogue and minimize any feelings of discomfort or pressure. Both focus groups and interview sessions were recorded, with the data securely stored in accordance with the university's data protection guidelines. To protect participants' identities, all data was anonymized by assigning pseudonyms ([Appendix 5](#)).

5.3 Data Processing and Analysis

The research team handled all transcription work, and all of the audio recordings and transcripts were securely stored on the university's drive, which is protected by two-factor authentication. For the Dutch focus group, the audio was first transcribed in Dutch before being translated into English by a member of the research team. To ensure the nuance of the discussion was adequately captured, the translated transcript was reviewed by a native speaker. Notes were added within the transcript to highlight specific phrases or concepts that did not translate well, such as references to education levels (e.g., HBO, MBO, BBL) and culturally specific idioms. The coding process was facilitated using Atlas.ti software. To ensure consistency and intercoder reliability (Bryman, 2012), the team conducted several collaborative coding sessions. Two sessions focused on developing the codebook, one on initial data analysis and theme identification, and another on refining themes and finalizing findings. The team reviewed coded data, clarified discrepancies, and refined the codebook by merging, adding, or removing codes as needed. This process ensured rigorous and consistent analysis. Thematic analysis was used to identify, analyze, and interpret patterns and themes within the data. The analysis incorporated a comparative approach, contrasting the experiences and viewpoints of the two cohorts. This approach allowed us to better explore how gender, cultural background, and educational levels may have influenced their responses. Both deductive and inductive coding approaches were utilized, following the 'codebook thematic analysis' framework proposed by Braun & Clarke (2019). This approach balances the structure and rigor of coding reliability with the reflexive nature of thematic analysis, which allowed us to work independently whilst maintaining a shared analytical structure. Deductive codes were derived from the theoretical framework, and inductive codes emerged naturally from the data during the analysis phase, allowing the team to capture unexpected themes and integrate them into the findings. Additionally, in-vivo codes were employed to capture unique or culturally specific expressions, particularly in the Dutch focus group. These codes preserved the nuance of phrases that could not be directly translated into English, such as '*huisje, loodje, beestje*,' an apparent course-wide play on the Dutch idiom '*huisje, boompje, beestje*.' While the original phrase refers to the ideal life of a house, a garden, and a pet, it was adapted by participants to include a piece of land instead of a tree reflecting shared ideas of an imagined future. A detailed table of codes can be found in [Appendix 7](#). Thematic synthesis clustered related codes and identified overarching patterns, resulting in three core themes: motivations and influences, collaborative learning, and gender dynamics.

6. Findings

6.1 Motivations and Influences

Intrinsic and extrinsic values are core motivators for educational path choices, core people help to actualize this decision, and community support is key to confidence.

6.1.1 Intrinsic Values

Career choice related to sustainability was a shared motivator, but it was expressed differently across groups. Given the focus of energy transition, we asked participants directly about environmentalism as a determinant value. Eight out of ten participants rated environmental protection highly, with Master's students showing intrinsic motivations tied to benevolence and universalism. Nancy rated environmental protection a "*strong five*," reflecting a passion for sustainability. Similarly, a female professor noted: "*some students are driven by a*

clear passion for sustainability and a desire to deepen their knowledge in the field." VET students, while acknowledging sustainability's importance, were more motivated by its technological aspects. Sjoerd explained: *"I just fully believe in being part of the solution,"* but later clarified: *"I think sustainability and sustainable techniques are very important, but I will never switch to driving an electric car."* Intrinsic motivations for the students thus reflected different theories; the women were driven more by values outlined in Schwartz' Value Theory whilst the young men were driven by outcome expectations as seen in SCCT.

6.1.2 Breadth of Sector and Job Security

Knowing that there are options in the field of energy transition and that, ultimately, getting a job wouldn't be a problem, helped students to actualize both their intrinsic environmental values and drive their decision to go down the energy transition path. Participants were motivated by the breadth and flexibility of their programs, including diverse specializations, interdisciplinary approaches, and opportunities to go abroad. Master's students valued the interdisciplinary combination of technical, legal, and business skills, while VET students appreciated the program's scope. Hidde described the appeal of electrical fields as *"extremely broad,"* while other participants recognised the high demand and financial stability of trades. For example, Yusuf noted that plumbers in Amsterdam often face an overwhelming workload, reflecting the job security and financial prospects in technical careers; *"I thought, if there is so much job security... and if you can ask that amount, that's nice if you have it for yourself."* Across focus groups, participants associated these fields with long-term stability and sustainable futures, highlighting the alignment between technical skills and environmental priorities, observing *"it's really about where the future lies, and that's definitely with sustainability and sustainable techniques."*

6.1.3 Influential Figures

Role models played a key role in building confidence and influencing students in their decisions to pursue the path of energy transition education. Influential figures such as family, peers, and teachers played a key role in shaping participants' career decisions, though their impact varied. For VET students, family influence was crucial, often tied to practical exposure. Wytse shared: *"If you start here with your father, and talk a bit. Then it was a nice profession. In the end, I didn't really go to an open day, but I did tag along with him a few times. That's when I thought, this is what I want to do."* Among young women, peers and teachers were more influential. Mindy noted: *"I was also motivated mostly to go to an engineering department because of my parents, and because of one specific teacher, who really really encouraged me into doing what I liked."* Aspirational figures, such as startup founders, inspired broader career ambitions, while personal relationships, like Sally's decision to study in Groningen to be near her partner, also shaped choices. These examples reflect the interplay of personal and professional influences on participants' trajectories.

6.2 Collaborative Learning

Students thrive in collaborative, interactive learning environments and are seeking community and support in their educational experience.

6.2.1 Role of Experiential Learning

Effective student engagement was strongly linked to the idea of 'learning while doing' in Situated Learning Theory (SLT). Common factors that emerged from both focus group discussions include excursions, practical

elements and real world application, interdisciplinary assignments (both at HBO and MBO level), and practicals. For example, one participant expressed how she feels about the practical assignment: *"We had an assignment about energy markets, policy, and finance. And I was focusing on the energy market, and I really liked it."* Another participant also mentioned *"all the testing labs around our building, because there's like the hydrogen one and to see really that's applied and they're testing the stuff on the solar power."* The importance of real world applications and the importance of internships was often mentioned in the VET focus group. One participant shared the importance of internship for him: *"I actually still didn't know what I wanted to do until we went on an internship. When I went to do an internship, I was working on a project for ten weeks. That was a really fun project. Of course, I was busy with the practical side of things... there you really learn how things work. So then I really liked it. I thought, yeah, I do want to do this."*

6.2.2 Open Communication

Both focus groups identified significant flaws in the communication and outreach strategies of their educational institutions, particularly regarding the accessibility and clarity of information for prospective students. Mindy expressed frustration, stating, *"It was extremely difficult for me to navigate through the website in general to see all the information,"* while Sally added, *"You really need to search, and the information is only about the specializations."* These issues often resulted in confusion and frustration, reflecting gaps in practices suggested by SLT. For example, when information is overly generalized or lacks practical context, it fails to support informed decision-making. Participants also suggested making video content accessible online to highlight engaging aspects of the program, such as cutting-edge facilities like testing labs for renewable energy technology and resources available to students.

Participants were also critical of open days, noting that their effectiveness depended heavily on the charisma of individual presenters rather than consistent program-level communication. One participant explained, *"I ended up in a room with [this program representative]. If I had ended up in a different room... where someone else was talking about another technical program... [I could've chosen differently]."* Both focus groups emphasized the importance of hearing directly from students during these events, with a participant suggesting, *"You just need an honest opinion about the program."* Participants expressed a desire for more honest representations of daily program realities, led by current students who could teach by example. This approach would help prospective students visualize themselves in the program.

6.2.3 Friendship and Community

Throughout both focus groups, participants frequently answered questions describing the importance of community, especially when experiencing aforementioned communication issues. Multiple participants highlighted the presence of other women in their program as a significant factor shaping their learning experience. For example, Nancy shared that *"We were six girls in the class. So it was not only... I was never alone, then in my bachelor I wasn't alone as well, so I always had like my, would say technical girls with me."* Sally interjected with an enthusiastic response of *"Yes!"* This was reinforced by the female professor's interview who suggested that having senior women who can guide newcomers is crucial, including informal meetings and informal support networks, such as groups where women can connect and share experiences, play a vital role in fostering confidence and resilience. Participants also shared that feeling like one part of a bigger international group was meaningful and supportive.

Relatability emerged as a key theme across both focus groups and the interview as a source of motivation and confidence building. This included aspects such as having peer support and feedback. Mentorship, in particular, stood out as an essential aspect of creating a supportive learning environment. One participant said, *“An hour of communication could teach you more than an entire five years,”* while another simply stated, *“We need a mentor. Period. Yes, very simple.”*

6.3 Gender Dynamics

Gender gaps in the energy transition sector were highlighted through deeper connections about weaknesses, opportunities, and inclusivity.

6.3.1 Female Minority Status in the Industry

Female research participants shared how they often face the challenges of being a minority, which affects their sense of belonging and visibility in educational and professional settings. Participants described feelings of isolation and difficulty finding relatable mentors or peers, with one noting, *“It’s hard to find someone who looks like you in this field. When you do, it’s usually someone very senior or far removed from your experience.”* The lack of female role models perpetuates underrepresentation, shaping institutional culture and reinforcing the perception that these roles are “not for women.” This, in turn, has affected their confidence in navigating their career paths. However, mentorship programs and women-focused networks can help address these challenges. As our expert interview revealed, *“to have reach-out programs and invite people to hear this, to hear that you can do it, that it’s not a big problem”* could provide vital support, reduce isolation, and empower women to see themselves in the energy sector.

6.3.2 Implicit Barriers

While many of the focus group participants initially downplayed gender as a significant barrier, deeper discussion revealed more implicit and subtle challenges. Female participants shared experiences of microaggressions, patronizing behavior, and the struggle to be taken seriously by male peers and instructors. One focus group participant noted that during a group assignment, she was *“treated like she was stupid”* by male peers who did not give her *“a chance to help.”* Similarly, another participant described how *“men tried to dumb down the information”* when explaining concepts to her. Participants elaborated that this behavior not only undermines women's confidence but also reinforces gender stereotypes regarding technical competence. One focus group participant later reflected on the impact of gendered messaging from an early age, stating, *“If you’re taught all the time that ‘this is not your topic’ or ‘you’re not too intelligent’ or ‘you cannot deal with math or engineering,’ you’re going to internalize it and say, ‘Why would I do this to myself? Let me do something easier.’”* The interviewee shared that even during workshops, women’s expertise was often questioned: *“Most of the people who sit in there, the males think that this woman is not the one chairing the workshop; they think she’s the one bringing the coffee for the coffee break.”* She shared that it’s also a broader institutional issue of invisibility for women in leadership and technical roles, reinforcing the need for role models and support.

6.3.3 Institutional Support for Gender Diversity

Institutional support is essential for addressing gender disparities in the energy transition sector. Initiatives aimed at gender diversity have the potential to challenge systemic biases and create a more equitable environment for women. One key insight from the expert interview was the importance of recruitment practices. She illustrated this by stating, *"Men, if there are five requirements, say, 'I just do it and I don't care, I will apply.' But women, if they see five requirements, they will say, 'I don't have the five, so I don't apply.' So we try to change that."* These findings highlight the need for gender-sensitive recruitment practices, such as rephrasing job descriptions to encourage women to apply and promoting a "growth mindset" approach to hiring. Initiatives like *'Girl's Day'* in German universities were cited as effective recruitment models, inspiring young women to pursue STEM careers through exposure to female role models.

7. Discussion

The findings demonstrate how students' career paths are shaped by both intrinsic and extrinsic factors, as predicted by Social Cognitive Career Theory and Situated Learning Theory. In terms of recruiting and engaging prospective students, our findings highlight how students' profession choices were largely influenced by outcome expectancies, both extrinsic (like financial incentives) and intrinsic (like personal fulfillment and environmentalism). The results of the study underscore the necessity of creating recruitment tactics that highlight these anticipated results. SCCT offers insightful information about the hiring and engagement process. For example, participants' confidence in their technical abilities demonstrated self-efficacy, or the conviction that one can succeed. This self-assurance frequently resulted from supportive learning environments, real-world experience, and role models. For instance, demonstrating the advantages of jobs in energy transition for the environment and society can appeal to students who value universalism, as defined by Schwartz Value Theory. The focus on experiential learning, through community-driven activities, practical projects, and internships, aligns with participants' inclinations toward useful, real-world applications. This connects to SLT which puts learning into the context of the environment. Deeper comprehension and skill development are fostered in collaborative learning environments where students interact with mentors and peers. NESSIE can improve student engagement and retention by including these components into E-campus activities.

Furthermore, when attracting underrepresented groups, such as women and VET students, barriers like low self-efficacy and limited access to role models should be considered in recruitment tactics and messaging. In order to dispel misconceptions and boost confidence, participants emphasized the value of open communication and relatability to the messenger in recruitment campaigns, such as female professionals and VET graduates. Campaigns that highlight the variety of career paths available in the energy industry from technical to leadership roles can aid in changing views and drawing in a larger audience. Addressing the stigmas associated with technical education in society might also improve recruitment efforts for VET students. Targeted programs such as flexible learning alternatives and mentorship programs are essential for both groups. As other studies have highlighted, efforts to recruit and engage women and VET students must directly address the barriers they face in order to build a more inclusive energy sector (European Commission, 2024). Female participants highlighted that it is particularly important for them to have mentorship programs and supportive, flexible work environments to remain engaged.

Finally, our findings show that students flourish in settings that allow them to "learn by doing." SLT's tenets should be incorporated into engagement tactics by placing instruction in real-world, community-focused settings. Programs that include interdisciplinary projects, site visits, and internships offer worthwhile chances to put skills to use. Furthermore, encouraging a feeling of community via networks of mentors and peers can boost perseverance and inspiration. According to the findings, E-campus should put an emphasis on welcoming environments where students feel appreciated and supported, which is consistent with SLT's focus on teamwork and social interaction.

7.1 Practical Implications for Client and Recommendations

Based on the data collection and analysis of this project as well as connections to the theories and literature review, we suggested the following recommendations (see [Appendix 9](#) for full details).

7.1.1 Recruitment

- Create Accessible Video Content by developing video tours of facilities, student experiences, and practical classes to better highlight cutting-edge technologies used in the programs. (Examples: [\[1\]](#) [\[2\]](#), Source: Firda Anne Wadman Wei event).
- Use promotional materials that highlight broad career opportunities in the energy transition sector to attract career-driven prospects.
- Present relatable role models, such as current students or alumni, sharing their authentic experiences in their expertise sector to inspire and connect with new prospects.
 1. [A Day in the Life of a First-Year Student](#) (Author: [Harvard University](#))
 2. [Alumni Maarten Hof](#) (Author: [Edward Freije](#)).
- Employ brochures and flyers during open student days that act as a short preview for the program, while providing fully detailed, user-friendly web content for in-depth exploration. ([Digital brochure example](#) / [Physical Brochure example](#))

7.1.2 Engagement

- Use Demonstrations and Workshops to make programs more appealing to tactile and experiential learners.
- Feature videos about women in the field or students and alumni on social media to increase relatability and visibility of programs.
 1. [Women Leading the Energy Transition in Web2 and Web3 Universes](#) (Author: [The Female Quotient](#))
 2. [Female Leadership - Energy for The Global Energy Transition](#) (Author: [UK Government](#))

7.1.3 Additional Recommendations

- Introduce Virtual Reality Tours to immerse prospective students in facilities and classrooms remotely, making programs accessible to a wider audience. ([Frankfurt School 360 VR Campus Tour](#), Author: [Frankfurt School of Finance & Management](#))
- Organize Networking Opportunities with faculty, alumni, and industry professionals to foster engagement and provide insights into real-world careers in energy transition.

- Incorporate gamification through educational challenges or games that highlight program benefits and create a more interactive recruitment experience.

7.2 Study Strengths and Limitations

The research design demonstrated notable strengths. The participant recruitment process was effective, successfully engaging participants and fostering open, meaningful discussions in focus groups. Additionally, interviewing final-year VET students proved especially valuable as they were nearing the completion of their studies, they could reflect on the entire trajectory of their education. The narrow focus on specific target populations further strengthened the research, as the tailored recommendations directly address their unique needs. This specificity enables the client to more effectively incorporate the findings into their existing recruitment strategies for young women and VET students. Finally, the project's emphasis on amplifying the voices of young people adds needed perspective to the field. This positive impact was reflected by one participant at the final presentation, appreciating that their experiences were taken seriously and translated into actionable recommendations.

During the study a number of challenges presented themselves. The research team lacked a native Dutch speaker, which posed challenges as some project elements required language proficiency and knowledge of the Dutch education system. Although translations were done by a C1-level Dutch speaker and checked by natives, some nuances might have been lost. Involving a native speaker, particularly during the Dutch focus group, could have enhanced data quality. The scope of this study did not encompass other demographic factors such as race and ethnicity, which are critical for understanding the diverse perspectives and barriers faced by underrepresented groups. This geographical and cultural specificity may limit the applicability of the recommendations to more diverse or culturally distinct contexts.

8. Conclusion

This project met the research objectives of providing the NESSIE project with actionable recommendations for recruitment and engagement for the target audiences of VET and female students. Using frameworks such as Social Cognitive Career Theory and Situated Learning Theory, the findings emphasize the importance of contextualized, experiential learning and inclusive recruitment strategies to address workforce needs in the green sector. Our findings revealed that several factors inform students' decision-making in regards to their education and career paths. Once enrolled in programs, students valued hands-on learning experiences, community based learning, and clear, coherent, and realistic communication. Students were highly motivated by outcome expectations and their imagined futures; both in terms of sustainable career paths and making a difference in the climate crisis. Learning environments should be created and developed with principles of SLT in mind, ensuring to incorporate student feedback and experiences. Effective outreach strategies require tailoring to target groups, diverse role models, and inclusive campaign development. Future research should further explore demographics such as race, ethnicity, and class, as well as engage policy-makers to address broader institutional and international factors influencing the energy transition.

Word Count: 6,592/6,600

References

- Aldossari, A.S. Vision 2030 and reducing the stigma of vocational and technical training among Saudi Arabian students. *Empirical Res Voc Ed Train* 12, 3 (2020).
<https://doi.org/10.1186/s40461-020-00089-6>
- Appling, B., Tuttle, M., Harrell, L., Ellerman, H., & Mabeus, D. (2022). Utilizing Social Cognitive Career Theory to Enhance the Self-Efficacy and Outcome Expectations of Students with Disabilities Through Career Development. *Professional School Counseling*, 26(1). <https://doi.org/10.1177/2156759X221098937>
- Atkins, K., Dougan, B.M., Dromgold-Sermen, M.S. et al. "Looking at Myself in the Future": how mentoring shapes scientific identity for STEM students from underrepresented groups. *IJ STEM Ed* 7, 42 (2020).
<https://doi.org/10.1186/s40594-020-00242-3>
- Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of Social and Clinical Psychology*, 4(3), 359–373.
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589–597. <https://doi.org/10.1080/2159676X.2019.1628806>
- Bryman, A. (2012). *Social research methods* (4th ed.). Oxford University Press.
- Catalano, A. (2015). The Effect of a Situated Learning Environment in a Distance Education Information Literacy Course. *The Journal of Academic Librarianship*, 41(5), 653–659.
<https://doi.org/10.1016/j.acalib.2015.06.008>
- European Commission. (2021). *The European Green Deal: Striving to be the first climate-neutral continent*. European Commission.
https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
- Fouad, N. A., & Santana, M. C. (2017). SCCT and Underrepresented Populations in STEM Fields: Moving the Needle. *Journal of Career Assessment*, 25(1), 24–39. <https://doi.org/10.1177/1069072716658324>
- Fetting, C. (2020). *The European Green Deal*. ESDN Report, December, 2(9).
https://www.esdn.eu/fileadmin/pdf/Publications/ESDN_Report_The_European_Green_Deal.pdf
- Gordon, S. (n.d.). Girls in STEM: How parents can inspire their daughters. Parents. Retrieved October 13, 2024, from <https://www.parents.com/girls-in-stem-how-parents-can-inspire-their-daughters-8726360>
- Gülhan, F. (2023). Parental Involvement in STEM Education: A Systematic Literature Review. *European Journal of STEM Education*, 8(1), 05. <https://doi.org/10.20897/ejsteme/13506>
- Hennink, M., Hutter, I., & Bailey, A. (2020). *Qualitative research methods*. SAGE Publications.

- Herrera, S. P. M. (2024). Situated learning theory. In *Theoretical models for teaching and research*. Washington State University.
<https://opentext.wsu.edu/theoreticalmodelsforteachingandresearch/chapter/situated-learning-theory/>
- Hill, R. J. (1997). Using vignettes in qualitative research. *Social Research Update*, 25, 1–4.
<https://sru.soc.surrey.ac.uk/SRU25.html>
- How the European Union could achieve net-zero emissions at net-zero cost. (2020). *McKinsey & Company*.
<https://www.mckinsey.com/capabilities/sustainability/our-insights/how-the-european-union-could-achieve-net-zero-emissions-at-net-zero-cost>
- Hughes R, Huby M. The application of vignettes in social and nursing research. *J Adv Nurs*. 2002 Feb;37(4):382-6. doi: 10.1046/j.1365-2648.2002.02100.x. PMID: 11872108.
- Inda, M., Rodríguez, C., & Peña, J. V. (2013). Gender differences in applying social cognitive career theory in engineering students. *Journal of Vocational Behavior*, 83(3), 346–355.
<https://doi.org/10.1016/j.jvb.2013.06.010>
- Kitzinger, J. (1995). Qualitative research: Introducing focus groups. *BMJ*, 311(7000), 299–302.
<https://doi.org/10.1136/bmj.311.7000.299>
- Krueger, R. A., & Casey, M. A. (1988). *Focus groups: A practical guide for applied research*. SAGE Publications.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge University Press.
- Le Roux, H., Prescott College Education / Sustainability Education, & Sherman, P. M. (2014). *The Big Barn: A case study in place-based education and design* [Doctoral dissertation, Prescott College]. ProQuest Dissertations & Theses.
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45(1), 79–122.
<https://doi.org/10.1006/jvbe.1994.1027>
- MCS Charitable Foundation. (2023). *Getting Gen-Z into retrofit and renewables jobs: The appetite is there, but not the awareness*. Edge Foundation.
<https://mcsfoundation.org.uk/wp-content/uploads/2023/11/Getting-Gen-Z-into-Green-Jobs-report.pdf>
- McLellan, H. (1996). Situated learning: Multiple perspectives. In H. McLellan (Ed.), *Situated learning perspectives* (pp. 5–17). Educational Technology Publications.

- Meyers, M., Trejo, Y. A. G., & Lykke, L. (2017). The performance of vignettes in focus groups and cognitive interviews in a cross-cultural context. *Survey Practice*, 10(3). <https://doi.org/10.29115/SP-2017-0017>
- Morgan, D. L. (1997). *Focus groups as qualitative research* (2nd ed.). SAGE Publications.
- Mozahem, N.A. Social cognitive theory and women's career choices: an agent—based model simulation. *Comput Math Organ Theory* 28, 1–26 (2022). <https://doi.org/10.1007/s10588-020-09317-6>
- Schwartz, S. H. (1992). Universals in the content and structure of values: Theoretical advances and empirical tests in 20 countries. *Advances in Experimental Social Psychology*, 25, 1–65.
- Schwartz, S. H. (1994). Are there universal aspects in the structure and content of human values? *Journal of Social Issues*, 50(4), 19–45.
- Sellars, Nicole, "CAREER DEVELOPMENT IN SPORT AND LEISURE: AN APPLICATION OF SOCIAL COGNITIVE CAREER THEORY" (2021). Dissertations. 826.
<https://digscholarship.unco.edu/dissertations/826>
- Simon, F., Engel, H., & Tyreman, M. (2020, December 4). *Why Europe must reskill workers to reach its climate goals*. www.euractiv.com.
<https://www.euractiv.com/section/energy-environment/opinion/why-europe-must-reskill-workers-to-reach-its-climate-goals/>
- Steg, L., & De Groot, J. I. M. (2012). Environmental values. In *Environmental psychology: An introduction* (pp. 223–243). Wiley-Blackwell.
- Steg, L., & de Groot, J. (Eds.). (2019). *Environmental psychology: An introduction* (2nd ed.). Wiley-Blackwell.
- World Economic Forum. (2023, May 23). *Europe's green skills revolution: What you need to know about the solar and wind industries*. <https://www.weforum.org/stories/2023/05/europe-green-skills-solar-wind/>

Appendix

Appendix 1. Focus Group Guide Young Women

Introduction (10 minutes)

Thank you all for taking your time to participate today, we really appreciate it! Before we start I wanted to introduce the research briefly, as well as set some ground rules for our discussion. My name is ____, and this is ____, who will be the notetaker today and supporting me. Today's discussion will form part of a study we're conducting with the Learning Hub Friesland in support of the NESSIE project. NESSIE is focused on boosting interest in technical education and careers in the energy sector to help meet the EU's goal of climate neutrality by 2050. The project aims to address the urgent need for more skilled energy transition professionals across disciplines and skill levels. We have chosen to focus on two groups in particular, vocational education students and young women, to see how organisations can more effectively recruit and engage this target audience. We want to hear your thoughts and experiences surrounding your current education and future career ambitions. Based on the discussion today, we will do our best to translate it into recommendations for more creative learning environments that will inspire and motivate students to build a future in the European energy transition.

Some formalities about the discussion today:

- As this is for research purposes, we've prepared a consent form and information sheet that I've emailed to you all in advance.
- We would like to record this session for research purposes, however all information from the discussion will be anonymized, and the recording subsequently deleted as soon as possible.
- However, I'd like to get verbal consent from you all now. ***Please state your name and yes/no to whether you agree to participate in the group discussion today and if you agree to be recorded.***
- The focus group will be approximately 90 minutes long, we plan to end at 1:30pm. The session may be shorter than planned, depending on how the discussion goes.
- Please help yourself to light refreshments/snacks as you'd like.

Ground Rules:

- Participation in this focus group is voluntary, and it's okay to abstain from discussing specific topics if you are not comfortable.
- There are no right or wrong answers.
- Please respect the opinions of others even if you don't agree.
- Try to stay on topic; we may need to interrupt so that we can cover all the material.
- Speak as openly as you feel comfortable.
- Help protect others' privacy by not discussing details outside the group.
- You don't have to respond directly to me. We encourage you to respond to each other.
- I would like to hear from all participants as equally as possible.

If you have any questions please ask them now, and I will do my best to answer them! If there are no further questions, then I'd like us all to introduce ourselves (name, study) and get started with the discussion! Let's go around the room.

Discussion and Questions

Opening Question:

OK, so glad you're all here today. So we'll start the focus group discussion with some simple questions to begin to get to know each other. We have two questions that we'd like you to answer with a numeric answer, ranging from 1 to 5. 1 being I don't care at all, to 5 being it's my #1 motivation:

- How important is protecting the environment to you?
- How much did this factor influence your decision to go into renewable energy as a profession?
- When you were a child, what type of career did you dream about having, and did it change? Please feel free to share why it did, if so.

Key Questions:

Recruitment and Motivation

Thanks for a great intro discussion. Now we are going to discuss more on your own reasons behind choosing this program you're currently in.

- When you chose your current study programme what were the most important deciding factors for you?
 - Prompt: Did anyone/a group/organisation influence your decision? **Family?**
 - Prompt: How did you initially find out about the program?
 - Prompt: What made you choose it over other programs?
 - Prompt: What made you choose your current institution ?
 - ★ *Provides some information into what recruitment channels works, and what unique selling points (USPs) worked*
- Based on your experience so far, what do you think could be done to attract more people like you who are female identifying to the programme?
 - Prompt: What specifically would make you more interested or motivated to apply?
 - Prompt: What would you say to someone who's considering entering the field?
 - ★ *Perceptions on recruitment strategies and how these can be tailored to the two subgroups*

Student Experience and Engagement

Now we are going to discuss your feelings towards your study programme and your experience throughout.

- Which parts of your current study programme do you find the most exciting?
 - a. Prompt: What specifically keeps you motivated to continue?
 - b. Prompt: Are there certain styles of teaching methods (practical work, projects, design labs, apprenticeships) you find most helpful?
 - c. Prompt: Environments (labs, online, peer learning, fieldwork, exchange)?
- Is there anything that you dislike about your current programme?
 - a. *Can follow similar prompts as above, just reframe with a negative lens*
- If you could design the perfect learning environment related to your study what would it look like?
 - Prompt: What kind of activities?
 - Prompt: What kind of support do you think would be needed?

Gender-Specific Questions

Of course we have touched on gender-specific aspects of your experience throughout this, but now we're going to move into questions that really center on this.

- As a female-identifying person, were there any barriers you faced when deciding to study in this field?
 - Prompt: class composition and gender balance
 - Prompt: have you experienced a male-dominant "boys club" mentality?
 - Prompt: lack of female identifying role models/teaching staff?
 - Prompt: negative stereotypes?
- How do you feel about the energy sector as a career option for both male and female identifying people?
 - Prompt: do you think that it is easily accessible to everyone?

Closing Questions:

To close the discussion, I'm going to share two short stories about students and their experiences related to studying and working in the energy sector. These stories, or vignettes, were created to reflect two conflicting perspectives and experiences. As I read them, consider if any parts of these stories resonate with you or if your own experiences are different. Feel free to share your thoughts on how you relate to these stories or what feels different in your own experience. There are no right or wrong perspectives here, the purpose is to spark discussion between you all.

Vignettes:

- Simone, 22, is passionate about green energy and is looking for an internship for her graduation project. In her classes and workshops, she often notices she's one of the only girls there. Sometimes, she feels out of place and worries, "Will it be hard to find my spot in such a male-dominated field?"
 - ★ ***Feeling out of place***
- Ellen, 18, is about to start studying for a degree in the energy sector. She's used to being the only girl in her technical classes but has always felt supported by her teachers and classmates who value her skills. Ellen feels motivated and believes she has what it takes to succeed in the industry, despite its reputation as a 'boys club.'
 - ★ ***Feeling in place***

What's Next:

Thank you so much for your active participation today! We really enjoyed the discussion and we think it'll provide good insights for the Learning Hub Friesland and the NESSIE project. Just for your information, we wanted to provide some of our next steps:

- Data will be analysed and from this we will identify some experts from the other side (teaching and recruitment staff, energy sector experts, policy makers) and organise expert interviews to supplement the data from today.
- On the 13th of January we will present our research findings to the client here in Groningen, based on this feedback we will finalise our report
- We hope to share the results of our data collection with you and, if possible, attend our final presentation in January. We will keep in touch with you about the details.

Appendix 2. Focus Group Guide Dutch Students

Introductie

Dank jullie wel dat jullie de tijd nemen om vandaag mee te doen, we waarderen het enorm! Voordat we beginnen, wil ik het onderzoek kort introduceren en een paar basisregels voor de discussie uitleggen. De discussie van vandaag maakt deel uit van een studie die we uitvoeren met de Learning Hub Friesland ter ondersteuning van het NESSIE-project. NESSIE richt zich op het vergroten van de interesse in technische opleidingen en carrières in de energiesector om bij te dragen aan het EU-doel van klimaatneutraliteit in 2050. Het project wil inspelen op de dringende behoefte aan meer vakbekwaam professionals in de energietransitie, op verschillende gebieden en niveaus. We hebben gekozen om ons te richten op twee specifieke groepen: mbo-studenten en jonge vrouwen, om te zien hoe organisaties deze doelgroepen effectiever kunnen werven en betrekken. We willen graag jullie gedachten en ervaringen horen over jullie huidige opleiding en toekomstige carrière doelen. Op basis van de discussie van vandaag zullen we ons best doen om dit om te zetten in aanbevelingen voor creatievere leeromgevingen die studenten inspireren en motiveren om een toekomst op te bouwen in de Europese energietransitie.

Een paar formaliteiten voor de discussie van vandaag:

- Aangezien dit voor onderzoeksdoeleinden is, hebben we een toestemmingsformulier en een informatiesheet voorbereid die ik jullie van tevoren heb gemaild.
- We willen deze sessie graag opnemen voor onderzoeksdoeleinden. Alle informatie uit de discussie wordt geanonimiseerd en de opname wordt zo snel mogelijk verwijderd.
- Ik wil nu graag mondelinge toestemming van jullie vragen. Noem je naam en zeg ja/nee als je akkoord gaat met deelname aan de groepsdiscussie en of je instemt met de opname.
- De focusgroep duurt ongeveer 90 minuten en [**eindtijd**]. De sessie kan korter duren, afhankelijk van hoe de discussie verloopt.

Regels:

1. Deelname aan deze focusgroep is vrijwillig, en het is prima om niet mee te praten over specifieke onderwerpen als je je daar niet prettig bij voelt.
2. Er zijn geen goede of foute antwoorden.
3. Respecteer de meningen van anderen, ook als je het er niet mee eens bent.
4. Probeer op het onderwerp te blijven; we moeten misschien soms onderbreken om alle onderwerpen te bespreken.
5. Spreek zo open als je je prettig voelt.
6. Help mee de privacy van anderen te beschermen door geen details buiten de groep te bespreken.
7. Je hoeft niet direct op mij te reageren. We moedigen aan dat jullie op elkaar reageren.
8. Ik wil graag dat iedereen zoveel mogelijk aan het woord komt.

Als je vragen hebt, stel ze dan nu, en ik zal mijn best doen om ze te beantwoorden! Als er geen verdere vragen zijn, stel ik voor dat we ons allemaal kort voorstellen (naam, studie) en dan beginnen we met de discussie!

Openingsvragen:

Om de discussie te beginnen, ga ik twee korte verhalen delen over studenten en hun ervaringen met studeren en werken in de energiesector. Deze verhalen, of vignetten, zijn gemaakt om enkele veelvoorkomende ervaringen weer te geven. Terwijl ik ze voor lees, denk na over of bepaalde delen van deze verhalen herkenbaar voor je zijn of dat jouw eigen ervaringen anders zijn. Voel je vrij om je gedachten te delen over hoe je je in deze verhalen herkent of wat anders voelt in jouw eigen ervaring. Er zijn hier geen goede of foute antwoorden; het doel is om de discussie tussen jullie op gang te brengen.

We gaan beginnen met het eerste verhaal...

- Jelle, 21, is in opleiding tot elektricien. Hij vindt het leuk om te leren hoe hij elektrische systemen kan repareren en installeren, maar soms vraagt hij zich af of er meer is. Hij denkt na over de vraag: "Kan ik mijn vaardigheden gebruiken voor grote energieprojecten of zelfs om nieuwe technologieën te helpen ontwerpen?"
- Koen, 18, geniet ervan om met zijn handen elektrische systemen te bouwen en te repareren, wat hij leuk en bevredigend vindt. Hij koos voor de energiesector omdat hij van praktisch werk houdt, zonder veel na te denken over lange termijn doelen. Soms vraagt hij zich af of alleen het leuk vinden van praktisch werk genoeg zal zijn voor zijn toekomst.
- Sytse, 20, komt uit een familie van elektriciens. Zijn broer, vader en grootvader waren allemaal vakmensen, en hij volgde hun voetsporen omdat zijn familie het wil en hij weet dat het hem een stabiele baan als elektricien zal opleveren. Buiten de baanzekerheid weet hij niet precies wat het vak nog meer biedt

Werving en Motivatie

- Wat wilde je worden toen je klein was? Is dat anders dan wat je nu studeert?
 - Prompt: Wanneer is dit veranderd?
- Welke factoren waren het belangrijkste bij de keuze voor je huidige studieprogramma?
 - Prompt: Heeft iemand, een groep of organisatie je beslissing beïnvloed?
 - Prompt: Hoe kwam je aanvankelijk op de hoogte van het programma?
 - Prompt: Waarom koos je dit programma boven andere programma's?
 - Prompt: Waarom koos je voor je huidige instelling?
- Wat denk je dat er gedaan kan worden om meer mensen zoals jij (bijvoorbeeld MBO-studenten, vrouwen en meisjes) aan te trekken voor het programma?
 - Prompt: Wat zou je specifiek meer geïnteresseerd of gemotiveerd maken om te solliciteren?

Studentenervaring

- Welke onderdelen van je huidige studieprogramma vind je het meest interessant?
 - Prompt: Kun je voorbeelden geven van interessante activiteiten?
 - Prompt: Wat houdt je specifiek gemotiveerd om door te gaan?
 - Prompt: Zijn er bepaalde lesmethoden (praktisch werk, projecten, ontwerp-labs, stages) die je het meest helpen?
 - Prompt: Welke omgevingen (labs, online, leren met medestudenten, veldwerk, uitwisseling)?
- Zijn er onderdelen van je huidige studie die je minder leuk vindt?
 - Vergelijkbare prompts met negatieve framing

- Hoe zou jouw ideale leeromgeving eruitzien als je deze zelf mocht ontwerpen?
 - Prompt: Welke activiteiten?
 - Prompt: Welke ondersteuning denk je dat nodig zou zijn?

Afsluitende Vragen en Toekomstige Ambities

- Wat zijn je toekomstplannen met betrekking tot je carrière, en hoe helpt je huidige studieprogramma je daarbij?
- Op een schaal van 1-5, waarbij 1 betekent dat het je weinig kan schelen en 5 dat het je #1 motivatie is:
 - Hoe belangrijk is het milieu voor jou persoonlijk?
 - Hoeveel heeft dit bijgedragen aan je beslissing om de hernieuwbare energiebranche in te gaan?

Wat nu?

Bedankt voor je actieve deelname vandaag! We hebben genoten van de discussie en denken dat het waardevolle inzichten zal opleveren voor Learning Hub Friesland en het NESSIE-project. Voor je informatie:

- We analyseren de gegevens en identificeren experts (onderwijs- en wervingspersoneel, energiesector-experts, beleidsmakers) voor aanvullende interviews.
- Op 13 januari presenteren we onze bevindingen aan de opdrachtgever in Groningen; feedback daarop zal ons helpen om het rapport af te ronden.

We hopen de resultaten met je te delen en nodigen je graag uit voor de presentatie in januari.

Appendix 3. Consent Form FG Young Women**Participant Information Sheet and Consent Form****Research Project:**

*From Interest to Impact: Transforming E-Campus Recruitment and Learning for the Energy Transition
(conducted as part of JMRP and in collaboration with The Learning Hub Friesland)*

Research Team:

Milica Arsenovic - m.arsenovic@student.rug.nl

Ashley McDermott - a.e.mc.dermott@student.rug.nl

Kate Lehane - c.m.lehane@student.rug.nl

Clio Lu - p.lu.8@student.rug.nl

Mazen Marouani - m.marouani@student.rug.nl

You may contact any member of the research team through the emails provided.

Participant Information Sheet**Research Goal:**

We are investigating how diverse prospective students, including VET students and female- identifying people, can be recruited and engaged at NESSIE's E-campuses through targeted recruitment and motivating learning environments to inspire careers in energy transition.

Purpose of Data Processing:

The data collected during this research will be used solely for academic purposes, such as:

- The understanding of the participant background and knowledge in energy transition.
- Highlighting the motives and aspirations behind the participant enrollment in their current program.
- Sharing research findings in academic publications, presentations, and possible future research, if consent is provided.

We will ask for your explicit consent if we plan to make the data available to other researchers or reuse it in future projects.

Type of Data Collected:

- Your opinions and thoughts that are shared during this focus group session.
- Audio recordings (if you consent).

Data Handling and Protection:

- Your data will be depersonalized, and your participation will be anonymous.
- The research team will store all data securely, and only authorized personnel will have access to the data.
- Data will be stored for three months after the project ends and will be securely deleted afterward.

Data Privacy:

- All personal data will remain confidential and will not be shared with any third parties without your explicit consent.
- Any identifiable information will be removed before publication to ensure anonymity.

Risks and Benefits:

- **Risks:** There are no anticipated risks from participating in this research. If any question causes discomfort, you are free to skip it or withdraw from the focus group at any time.
- **Benefits:** Although there is no direct compensation for participating, your involvement will help advance recruitment strategies for multiple audiences in energy transition in island based communities.

Voluntary Participation:

- Participation is entirely voluntary. You may withdraw from the study at any point, even during or after the focus group, without any negative consequences.

Participant Rights:

- You have the right to access, rectify, or erase any of the personal data you provide during this research.
- You have the right to lodge a complaint with a supervisory authority if you feel your data is being misused.
- You can withdraw your data up to the point of final publication.

Post-Project Data Use:

- If we plan to reuse your data for future studies, we will request additional consent. If you agree, the data may be used by other researchers in compliance with GDPR guidelines.

Contact Information:

For any queries or concerns, please contact any of the researchers mentioned in the beginning of this form

For data protection concerns, you can reach out to our Data Protection Officer:

Mr. A.R. (Arjen) Deenen (a.r.deenen@rug.nl)
University of Groningen
Postal address: P.O. Box 72 9700 AB Groningen
An. Central Privacy Desk
E-mail: privacy@rug.nl

Participant Consent Form

Please read and tick the boxes to indicate your agreement:

1. ☐ I have read and understood the information provided about the research project.
2. ☐ I have had the opportunity to ask questions about the study and my participation.
3. ☐ I understand the purpose of data collection and how my data will be used.
4. ☐ I voluntarily agree to participate in the research study.
5. ☐ I understand my rights, including my right to withdraw at any time without giving a reason.
6. ☐ I consent to the processing of my personal data as outlined in the information sheet.
7. ☐ I agree to be audio-recorded during the interview.
 - o If no, please specify:
.....
8. ☐ I agree to the reuse of my anonymized data at the end of the project for future research.
 - o If no, please specify:
.....
9. ☐ I agree to the transfer of my anonymized data to a third country or international organization, if necessary.
 - o If no, please specify:
.....
10. ☐ I agree to the use of automated decision-making processes (e.g., profiling), where applicable.
 - o If no, please specify:
.....

Participant Name:

Signature:

Appendix 4. Consent and Information FG Dutch

Informatie en Consent

Beste deelnemer,

Hartelijk dank voor uw interesse in deelname aan dit onderzoek. In deze brief wordt uitgelegd wat het onderzoek inhoudt en hoe het onderzoek zal worden uitgevoerd. Neem even de tijd om de volgende informatie aandachtig door te lezen. Als bepaalde informatie niet duidelijk is, aarzel dan niet om de onderzoeker om verdere verduidelijking te vragen, of stuur eventuele vragen naar het e-mailadres aan het einde van deze brief.

WAAR OVER DIT ONDERZOEK?

De studie 'From Interest to Impact: Transforming E-Campus Recruitment and Learning for the Energy Transition', is onderdeel van de JMRP-cursus voor de RUG Research Master Ruimtelijke Wetenschappen. Het onderzoek wordt geleid door de volgende vragen:

Hoe kunnen E-campussen op NESSIE-locaties studenten effectief werven en betrekken, om hun interesse in het ontwikkelen van technische vaardigheden en het nastreven van carrières in de energietransitie te bevorderen?

1. Welke wervingsstrategieën kunnen worden gebruikt om verschillende groepen studenten aan te trekken voor E-campusprogramma's gericht op energietransitie?
2. Hoe kunnen E-campussen leeromgevingen en ervaringen creëren die studenten motiveren om een carrière als installateur/ingenieur in de energietransitie na te streven?

Dit onderzoek heeft als doel te onderzoeken hoe diverse groepen toekomstige studenten, waaronder mbo-studenten en vrouwen, kunnen worden geworven en betrokken bij de E-campussen van NESSIE. Door middel van gerichte wervingsstrategieën en motiverende leeromgevingen willen we hen inspireren om een carrière in de energietransitie na te streven. Voor dit onderzoek willen we enkele studenten interviewen over hun ervaringen en motivaties. We zijn geïnteresseerd in gesprekken met studenten zoals u om een beter inzicht te krijgen in onze onderzoeksvraag

WAT HOUDT DEELNAME IN?

Deelname aan het onderzoek is vrijwillig en omvat het beantwoorden van een aantal vragen over de ervaringen en motivaties van studenten met betrekking tot werk in de energiesector. De gestelde vragen zijn algemeen voor alle deelnemers en worden geanalyseerd en opgenomen in het onderzoeksproject, dat zich richt op het verbeteren van het begrip van studentenervaringen en hun motivatie voor een carrière in de energiesector.

MOET JE DEELNEMEN?

Deelname aan dit onderzoek is volledig vrijwillig en geïnterviewden kunnen er op elk moment voor kiezen om zich terug te trekken uit het onderzoek en ervoor kiezen om de vragen niet te beantwoorden zonder gevolgen of zonder opgave van redenen.

ZIJN ER RISICO'S BIJ DEELNEMING?

Er worden geen risico's verwacht bij deelname aan dit onderzoek. Als een vraag ongemak veroorzaakt, staat het u vrij deze over te slaan of op elk moment uit de focusgroep te stappen.

ZIJN ER VOORDELEN BIJ DEELNEMING?

Hoewel er geen directe vergoeding is voor deelname, helpt uw betrokkenheid bij het verbeteren van wervingsstrategieën voor verschillende doelgroepen in de energietransitie in eilandgemeenschappen.

HOE WORDT DE DOOR U VERSTREKTE INFORMATIE OPGENOMEN, OPGESLAGEN EN BESCHERMD?

Van het interview wordt een audio-opname gemaakt met behulp van een opname apparaat, zoals een smartphone recorder. De opnames worden getranscribeerd en geanonimiseerd, waarbij zowel de opnames als de transcripties worden opgeslagen op een beveiligde schijf die door de universiteit wordt verstrekt. Na voltooiing van het groepsproject worden alle opnames verwijderd en wordt door geen enkele onderzoeker een verslag van het gesprek bewaard. De daadwerkelijke namen van de geïnterviewden zullen in geen enkel document expliciet worden vermeld, maar zullen worden geanonimiseerd en gecodeerd.

WAT GEBEURT ER MET DE RESULTATEN VAN HET ONDERZOEK?

Alle informatie die tijdens het onderzoek wordt verzameld, zal worden geanalyseerd en opgenomen als onderdeel van de JMRP-cursus voor de RUG Research Master Ruimtelijke Wetenschappen. Na voltooiing en beoordeling van het proefschrift worden ruwe gegevens (zoals opnames) en verslagen van de focusgroepen verwijderd.

ETHISCHE GOEDKEURING

Alle onderzoekers zullen zich houden aan relevante ethische normen in overeenstemming met de Rijksuniversiteit Groningen en onder toezicht van hun docenten.

GEÏNFORMEERD TOESTEMMINGSFORMULIER

Als u akkoord gaat met deze voorwaarden, onderteken dan het formulier voor geïnformeerde toestemming. Dit betekent dat u de intentie heeft om deel te nemen, terwijl u zich op elk moment kunt terugtrekken.

MET WIE MOET U CONTACT OPNEMEN VOOR MEER INFORMATIE?

Als je nog vragen hebt, neem dan gerust contact met mij (Kate Lehane) op via dit e-mailadres: c.m.lehane@student.rug.nl

Titel van het onderzoek: *From Interest to Impact: Transforming E-Campus Recruitment and Learning for the Energy Transition*

Naam deelnemer:

Onderzoek

- Ik heb het informatieblad gelezen en heb eventuele aanvullende vragen aan de onderzoeker kunnen stellen.
- Ik begrijp dat ik op elk moment vragen mag stellen over het onderzoek.
- Ik begrijp dat ik het recht heb om op elk moment en zonder opgave van reden uit het onderzoek te stappen.
- Ik begrijp dat ik op elk moment kan weigeren een vraag te beantwoorden, zonder enige gevolgen.
- Ik begrijp dat ik geen direct voordeel heb van deelname aan dit onderzoek.

Vertrouwelijkheid en gegevensgebruik

- Ik begrijp dat geen van mijn individuele gegevens aan iemand buiten het onderzoeksteam zal worden bekendgemaakt en dat mijn naam niet zal worden gepubliceerd.
- Ik begrijp dat de verstrekte informatie alleen zal worden gebruikt voor dit onderzoek en publicaties die direct verband houden met dit onderzoeksproject.
- Ik begrijp dat gegevens (toestemmingsformulieren, opnames, transcripties van interviews) gedurende 5 jaar op de Y-schijf van de server van de RUG worden bewaard, in overeenstemming met de universitaire AVG-wetgeving.

Toekomstige betrokkenheid

- Ik wens een kopie te ontvangen van de wetenschappelijke output van het project.
- Ik geef toestemming om opnieuw gecontacteerd te worden voor deelname aan toekomstige onderzoeken.

Nadat ik al het bovenstaande heb gelezen en begrepen, ga ik akkoord met deelname aan het onderzoek: ja / nee

Datum

Handtekening

In te vullen door de onderzoeker

- Ik verklaar dat ik de onderzoeksdeelnemer grondig heb geïnformeerd over het onderzoek en de overige vragen naar mijn beste weten heb beantwoord.
- Ik ga ermee akkoord dat deze persoon deelneemt aan het onderzoek.

Datum

Handtekening

Appendix 5. Focus Group Participant Profiles

Focus Group 1 - Vocational Education Students (5-8 students)

Demographics

- Age: 18-25
- Gender: mixed
- Educational background: currently enrolled in or recently completed vocational training programs related to technical fields (e.g., mechanical, electrical, renewable energy, construction, etc.).
- Location: Groningen and Friesland

Motivation and Goals:

- Interested in acquiring technical skills that are in demand in the energy sector
- Looking to increase their employability in a specific trade or sector, specifically the energy transition sector (e.g., renewable energy or energy efficiency technologies).
- May view vocational training as a pathway to stable, well-paying jobs, but might not be familiar with the specific opportunities in the energy transition field.

Potential Barriers for Participants:

- Lack of awareness about careers in the energy transition field.
- Limited exposure to or understanding of how vocational skills apply to energy transition roles.
- Financial or time constraints may affect their ability to participate in additional training.

Table 1. Example Participants Focus Group 1

<i>Name</i>	<i>Sander van Rijn</i>	<i>Theun Bos</i>	<i>Fleur van Dijk</i>
Age	21	24	18
Nationality	Dutch	Dutch	Dutch
Location	Beijum, Groningen	Drachten, Friesland	Leeuwarden, Friesland
Study Field/Occupation	In the middle of his studies at Alfa College Groningen	In his last year of study and training at Firda Drachten	Just started studying at Firda de Eenhoorn, Leeuwarden
Background	Grew up in a working-class family; interested in practical skills	Comes from a technical family, father works in renewable energy	Recently finished highschool, she's the first in her family to pursue a technical education
Interests	Passionate about sustainability, enjoys hands on projects	Wind energy and mechanical engineering	Enthusiastic about green energy especially tidal power
Sources of Information	Lectures, talks and workshops at school, as well as online news	Learns relevant information through his internship	Attended a number of open days, as well as social media
Additional	Wants to work in the local renewable energy sector after graduation, maybe on Ameland	Hoping to get a job offer at his internship full time in wind turbine maintenance and repair	Wants to specialize in tidal energy systems and potentially move abroad

Focus Group 2 - Women and Girls (5-8 students)

Demographics

- Age: 18–25 years old
- Gender: female (and may include girls in high school, recent graduates, or young women already in training or the workforce).
- Educational Background: ranges from high school and vocational school students interested in STEM subjects to those pursuing post-secondary education or vocational training, female technicians, university students, or academics.
 - Interest specifically in recruitment young women in areas beyond students in VET
- Location: preferably Groningen and Friesland, but can be from outside.

Motivation and Goals:

- Interested in pursuing education and careers in fields that offer meaningful work and societal impact, particularly in sustainability and environmental protection.
- Curious about career opportunities in technical fields but may feel unsure about entering traditionally male-dominated industries like energy transition.
- Seeking inspiration and role models to guide their career choices, with a focus on gender diversity and inclusivity in technical fields

Potential Barriers for Participants:

- Gender stereotypes and a lack of representation in technical fields may prevent them from being interested in the energy transition sector.
- May face uncertainty regarding the possibility of balancing work in technical roles with other life commitments (e.g., family responsibilities) (also perceptions about the physicality of labor?).
- Lack of confidence in technical abilities due to limited exposure to relevant subjects during their earlier education (and societal biases).

Table 2. Example Participant Focus Group 2

Name	<i>Dide Heidema</i>	<i>Anna Renkema</i>	<i>Aoife Kinsella</i>
Age	23	18	25
Nationality	Dutch	Dutch	Irish-English
Location	Ten Boer, Groningen	Gorredijk, Friesland	Groningen Binnenstad
Study Field/Occupation	Recently graduated the masters of Energy for Society at HanzeHogeschool	Recent highschool graduate, went to open days at Alfa College and Firda.	International student in Groningen, just finished her MBA in Energy Transition at the RUG and applying for PhD position
Background	Grew up in a family of electricians, strong in technical subjects, but unsure if she is fit for the industry/profession	Father and grandfather were electricians, she was always good at technical courses at school and is interested to see if this fits her future. However, she's not sure if there is space for her in the industry.	Strong academic background, interested in the research opportunities surrounding the energy transition, specifically at local and regional levels
Interests	The societal aspect of the energy transition	Interested in practical work and technologies in general	Looking to secure funding for her PhD

Sources of Information	Social media, university, and online news platforms	Family, highschool, open days	LinkedIn, government publications, news platforms
Additional		Unsure if she should do HBO or MBO education	Looking for research funding opportunities, passionate about inter-regional collaboration on the energy transition

Table 3. Participants Pseudonyms and Demographics

<i>Pseudonym</i>	<i>Focus Group</i>	<i>Education</i>	<i>Education Stage</i>	<i>Nationality</i>
Wytse	VET Students	SmartEnergy (Firda)	Final year, MBO	Dutch
Hidde	VET Students	SmartEnergy (Firda)	Final year, MBO	Dutch
Yusuf	VET Students	SmartEnergy (Firda)	Final year, MBO	Dutch
Sjoerd	VET Students	SmartEnergy (Firda)	Final year, MBO	Dutch
Allard	VET Students	SmartEnergy (Firda)	Final year, MBO	Dutch
Nancy	Young Women	Sustainable Energy System Management (Hanze)	Masters. HBO	German
Elizabeth	Young Women	European Master Sustainable Energy System Management (Hanze)	Masters, HBO	German
Caroline	Young Women	European Master in Sustainable Energy System Management (Hanze)	Masters, HBO	German
Mindy	Young Women	European Master in Renewable Energy (Hanze)	Masters, HBO	Romanian
Sally	Young Women	European Master in Sustainable Energy System Management (Hanze)	Masters, HBO	Iranian

Source: data compiled by researchers

Appendix 6. Interview Guide Expert

Introductory Questions (2-3 minutes)

- Can you briefly introduce yourself and tell us about your work as a researcher/professor?
 - Age, nationality/country, current role and projects
- What are some key projects or initiatives that you're currently involved in?
- How involved are you(or the professors from your department) in the decisions regarding recruiting the new students?

Program Specific Questions (15 minutes)

- From your perspective, what motivates students to enroll in programs related to the energy sector and energy transition?
 - Prompt: Do they primarily see it as a career path, a passion for sustainability, or both?
- If you have this information, what are the main challenges students face during their studies in energy transition-related programs?
 - Prompt: Technical? Financial? Industry related issues (for example, stereotypically male-dominated field)?
- In what ways do the energy programs at the RUG prepare students for the challenges and opportunities of working in the energy sector?
 - Prompt: Technical skills? Interdisciplinary approaches? Sustainability focus?

Recruitment Questions (more tailored to a professor or academic)

1. How do you engage with prospective students, either directly or indirectly?
 - a. Prompt: preparing course descriptions, participating in open days, student for a day initiatives, or collaborating with institutional recruitment teams
2. From your perspective, what recruitment approaches have been most successful in attracting students to energy-related programs?
 - a. Prompt: social media campaigns, partnerships with schools, student for a day initiatives, sustainability messaging
3. What challenges does your programme (or faculty) face in attracting new students?
 - a. Prompt: Funding? Awareness? Competition? Societal perceptions?
4. In light of the EU Green Deal's ambitious goal of training 14 million people in the energy sector by 2050, what do you think needs to change to inspire and attract more young people to this field? How can we connect with their values and emphasize the urgency of the ET?

Gender-Specific Questions

1. As a woman in a traditionally male-dominated field, could you share your experience working in the energy sector?
 - a. Prompt: Have you faced any specific challenges?
 - b. Prompt: Do you see progress in gender diversification in the sector?
2. Have you observed differences in how male and female students engage with the energy transition?
 - a. Prompt: Do you think gender plays a role in their motivation or approach to the subject?

3. From your experience working in this field, how can programmes or institutions better support gender diversity?

Closing questions (2 minutes)

The following closing questions aim to summarize and reflect on the interview. You are encouraged to share any remaining insights or suggestions.

- What advice would you give to young women considering a career in energy transition or engineering?
- Is there anything else you'd like to add?

Appendix 7. Codebook

<i>Theory</i>	<i>Concept (Main Code)</i>	<i>Definition</i>	<i>Sub-Codes</i>
Place Based Education and Situated Learning Theory	Experiential Learning	Learning through direct, hands-on experiences makes student engagement more meaningful because real-world activities bolster their knowledge and skills more than what the classroom can provide.	Excursion / Fieldwork, LabWork / Integration of Learning & Place / Internship / Problem Solving / Project-based Tasks
	Community	A collective of individuals within a specific geographical or cultural context, whose involvement in education fosters shared learning, collaboration, and mutual problem-solving.	Collaboration / Friendship / International Community / Learning Hub / Mentorship / Partnership
	Learning Environment and Feedback	The physical, digital, and social spaces where learning occurs and the systems through which students receive evaluation and guidance.	Feedback loop with teacher / Learning environment
	Project and Academic Activities	The structured tasks, assignments, and practical engagements that students undertake as part of their academic program which helps building technical expertise and encourages problem-solving.	Clearer messaging on the website / Diverse lectures / Need for breaks / Problem with course offering / Problem with guest lecture / Problem with syllabus / Program timeline structure
Social Cognitive Career Theory	Person Factors	Individual characteristics that influence a student's career aspiration	Culture / Gender / Socioeconomic Status
	Outcome Expectations	Beliefs about the anticipated consequences of specific actions, including physical, social, and self-evaluative outcomes.	Monetary Rewards / Self-Satisfaction / Social Approval
	Agency	The capacity of individuals to make choices and act independently in their career path, moderated by external conditions.	Career Agency
	Motivation	Internal and external factors that drives an individual to pursue a specific goal	Clear career perspective / Tangible Impact / Target undecisive candidates
	Support and Barriers	External factors influencing career choices, which can either support or act as obstacles.	Family Support / Peer Influence / Peer support / Role Models / Study Advisor / Teacher/Lecturer
Schwartz Value Theory	Openness to Change	stress independence, creativity, and readiness for new experiences.	Self-Direction / Stimulation
	Self-transcendence	concern for the welfare of others, society, and the environment.	Benevolence / Universalism

	Self-interest	The pursuit of personal goals, driven by the desire for access, recognition or control.	Achievement / Goal / Power
	Conservatism	Emphasize tradition, security, and stability.	Conformity / Security / Tradition
Other (inductive)	Gender	The influence of gender on students' experiences, opportunities, and perceptions within academic and professional settings,	Being taken seriously / Efforts to Encourage Women in STEM / Equal chance / Gendered perceptions in recruitment / Gender roles / Minority status
	Recruitment	The strategies and processes used to attract students to academic programs, which focus on establishing confidence, highlighting learning experiences, and providing an inside look at the program's contents.	Building confidence / Focus on Learning / Inside look of the program / Language Inclusivity / Multidisciplinary / Personalized approach / Recruitment platforms / Social group identity

Appendix 8. Reflection

Our project was not unique. Like any group project, we experienced our fair share of highs and lows. However, during the process we learned valuable lessons about working with clients, managing team dynamics, and making the most of our individual strengths. This reflection will dive into some of those insights.

Client Collaboration

Over the past five months, our relationship with our client, Frank, has been professional, productive and collaborative. His enthusiasm and openness to ideas, in combination with his practical support (connecting us with an intern to assist with Dutch-language tasks), really supported our progress. Furthermore, Frank's willingness to share relevant contacts helped guide us and save time when it came to participant recruitment. Collaboration between the team and Frank was realistic and open, allowing us to focus on feasible deliverables that met the scope of the project as well as Frank's expectations. However, some challenges emerged in regards to communication. Mika was originally designated as the main point of contact to help streamline communication. As the project progressed, this system fell slightly to the wayside which sometimes led to chaotic email chains. This was not a major challenge, but something that could be addressed through a more structured approach to project management (PM) and task division. Furthermore, differences in communication styles between Frank and the group occasionally caused some stress. While we perceived some emails as urgent, Frank often responded at a more leisurely pace, if at all. This was most obvious during participant recruitment when we were awaiting an update from both Frank and the contact from Firda. The discussion was scheduled in a week, yet we had heard nothing from either of them regarding the number of participants or location. In the end, Ashley followed-up with Frank via WhatsApp and we got the relevant information in time. This communication discrepancy may have been influenced by cultural differences, as people from the north of the Netherlands are generally more relaxed in their professional interactions. These issues, though manageable, highlighted the importance of aligning communication expectations early in the project. In future projects, especially those with such an international team, it would be worthwhile to dedicate time to understanding the clients communication preferences and cultural context at the outset of the project. This would be valuable not only for team-client relations, but also the internal dynamic in the team as, for example, sometimes tensions arose about whether it was appropriate to send follow-up emails late on a Friday afternoon.

Group Collaboration

In terms of internal collaboration, there was definitely a learning curve, but ultimately, we achieved a final product and a process we are proud of. Internally, each team member played to their strengths, creating an environment that allowed us to learn from one another. Kate's organizational skills and Dutch language proficiency ensured smooth planning, Mika's communication and calendar management kept us on track, Mazen's openness to conducting fieldwork provided contextual insights, Clio's academic writing skills enhanced the quality of our report, and Ashley's ability to facilitate discussions made team meetings more efficient and productive. Despite this, we faced some challenges in the first half of the semester. Initially, we decided against a clear PM structure and defined roles, taking a more consensus based approach. However, this resulted in inconsistent task allocation and (unnecessarily) elevated stress levels. These issues were only exacerbated by our chosen communication platform, WhatsApp. The informal and one-dimensional nature of WhatsApp sometimes led to misunderstandings, especially during high pressure moments like the Project Plan deadline.

Additionally, using WhatsApp blurred work-life boundaries, as messages were sent at all hours, resulting in the feeling that we could never rest as we were always "on." Midway through the semester, we held a check-in meeting to discuss team dynamics and establish some guidelines to work together in a healthier and happier way. This meeting provided space for us to express our experiences, frustrations, and desires moving forward. We addressed the aforementioned issues by implementing structured PM through a task tracker and establishing guidelines for healthier communication. For example, we agreed to limit WhatsApp messages outside working hours unless urgent. These changes significantly reduced stress which allowed us to meet deadlines happier and more efficiently.

For future projects, we would prioritize establishing structured PM and defining team roles from the outset. Furthermore, regular feedback meetings that discuss interpersonal and process-related issues would be invaluable. We conducted this at the midpoint of the project, but it would be even better if done quarterly; thus three during the project and one post project meeting to reflect on the process in its entirety (e.g. 2 in Block 1a, 2 in Block 1b). Based on our experience during JMRP, we believe that these kinds of measures would result in smoother collaboration, both internally and with clients, ensuring a more effective and enjoyable working experience for everyone.

Appendix 9. Recommendations:

Recruitment

Parental support:

Organizing a **Parents' Day** that highlights career opportunities and presents real-life success stories from multiple role models, engaging them more in early influence over their children [1] as well as conducting parent interviews [2] are strategies proved by existing literature. Parental involvement has been shown to play a major role in influencing students' agency in STEM education. As showcased by 24 studies, which most of them occurred in the USA, that concluded that parental awareness enhances students' internal and external motivations, establishing a strong relationship with their willingness to learn science and self-direction. (Gülhan, F., 2023)

Addressing the STEM equality gap:

Tailoring recruitment strategies around establishing confidence for girls when facing STEM career choices is a necessity as a study entitled "[The Girl's Index](#)" published by "[Ruling Our eXperiences \(ROX\)](#)" demonstrated how the insufficiency of role models in STEM as well as the persistent stereotypes that decide "who belongs where" contribute to the decline of women participation in these fields, [Dr. Lisa Hinkelman](#), founder and CEO of ROX and the author of this study states: "*Make it crystal clear that STEM isn't just for boys. Actively seek out and showcase successful women in STEM who are changing the world. Make these role models a regular part of your family's conversations, media consumption, and reading choices.*" Addressing this can be done through various practices such as "Being a stereotype buster" by promoting female leaders in STEM, challenging the male dominance in these fields as shown in the following examples: [3], [4]. "Girl's day" should also be transitioned to concepts similar to "[STEMblazers](#)" where girls could interact with professional women in realistic workplace settings (e.g., lab tours or job-shadowing opportunities). Recruitment can also foster a growth mindset by helping young girls understand that STEM skills are developed through learning and effort as well as helping them build confidence in general as other studies show that confident girls are 20% more likely to pursue a STEM career path ([Gordon, S.](#), 2024)., this can be further highlighted through some quotes such as "*We need not only to tell them they're pretty when they're young, because pretty doesn't get you far, we need to start telling them they're smart too*" [5],

Engagement

Mentorship emerged as a key theme in this study, the potential recruitment strategy that NESSIE aims to develop requires a careful consideration to the influence of mentors as it plays a part in the shaping of the scientific identity and contribute to the development of leadership in STEM fields, which heavily align with the SCCT established earlier in this study [6], as indicated by [Kaitlyn Atkins](#) & al., 2020, through a qualitative study that aimed to identify the link between mentorship and scientific identity, applying mentorship in STEM can be done through focusing on clustering the students into pairs or groups, it has been proven that doing so would increase a student's confidence, [Edutopia](#) demonstrated, in one of their videos, that **buddy systems** helps students overcome the "imposter syndrome" especially in early stages of the programme and makes for a perfect background to establish social bonds with others [7]. As we scope out a little bit to a more generalized concept, NESSIE should also consider incorporating **peer mentorship** strategies as it has proven to be very

important in delivering information while keeping in mind the social diversity of receivers. An informal content published by the [University of Kentucky](#), shows how comfortable students are when interacting with a peer mentor as they would assume that they are their equal, *“have gone through the same difficulties as them and came out of the other side better”* [8]. This does not disregard the teacher’s significant influence on students, because even if peers are as competent as teachers in delivering information, teachers are much more experienced in “how to deliver”, dealing with student’s psychology and behaviour, therefore, it is very **important to also overlap mentorship with parental support** through organizing more frequent "Open Classroom Days", it has been demonstrated that parents tend to learn from teachers and pass on their influence to their children, greatly contributing to the shaping of a student’s career preferences [9].