



Sharing and Repairing at University: On Student Practices, and the Future of the Circular Campus

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Abstract

For decades, Higher Education Institutions (HEIs) have added their names to multi-scale environmental declarations and programmes for action, such as UNESCO’s ‘Education for Sustainable Development’. More recently HEIs have incorporated key facets of the Circular Economy into their norms and practices. While such agendas often focus on waste management regimes and infrastructural issues, this paper argues that on-campus borrowing and repairing practices are pivotal to any ‘circular campus’ goals, particularly the practices of students. Yet, little is known about the current borrowing and repairing attitudes and behaviours of HEI attendees. In response, this paper discusses the results of a project at Cardiff University (Wales), which surveyed students about what they currently borrow and repair; what they would like to borrow and repair; and what stands in the way of them doing more. The results show that, despite popular discourse that young adults—in particular Generation Z—are the ‘sustainability generation’, results suggest their attitudes and practices align quite closely to the broader population trends as drawn from the extant literature, in terms of barriers to action and low engagement with formal sharing and repairing platforms and spaces. As such, this paper argues that forms of circular practices need to be incorporated into on-campus ‘activist learning’ to increase skills and confidence amongst students: and to work towards displacing the norms of high consumption lifestyles that students are starting to display.

Keywords Circular Economy · Higher Education · Borrowing · Repairing

Introduction: Towards the Circular Campus?

Universities and Higher Education Institutions (HEIs from hereon) have, for decades, been adding their names to an array of international environmental declarations and programmes for action. From the 1972 Stockholm Declaration on the Human Environment [1] to more recent Climate Emergency declarations—alongside an increase in institutional Net Zero plans and goals [2] — HEIs are focussing on how facets of sustainability can and

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do inform teaching curricula, academic research, campus operations [3] and more recently, civic and community outreach. As Latter and Capstick [4: 1] argue, this is a positive move on many fronts, not least because:

‘These institutions are uniquely situated to lead the way in responding to the climate and ecological emergency as they are multidisciplinary and collaborative, part of the local and national economy, able to think longer term, and provide a fertile space for discussion and debate’.

In addition, HEIs potentially offer multiple co-benefits within and beyond the institution. For one, the transmission of sustainability knowledge via curricula can potentially create ‘cascade effects’ for individuals and society. Students can go on to become professionals who spend (some parts of) their working lives helping to improve facets of socio-environmental sustainability [5], while also being ‘sustainable citizens’ in their personal and professional practices. Such a perspective does currently frame some high-level HEI sustainability strategies, which aim to ‘empower our students, graduates, and staff to become sustainable citizens who make a positive contribution to society and are active within their communities’ [6: no page].

Another potential co-benefit, which has received less attention in the literature and University Net Zero goals to date, is the how an ‘education for sustainable development’ agenda can contribute to Net Zero and Circular Economy goals through facilitating student sharing and repairing practices – the focus of this paper. This is because HEIs’ current Net Zero goals, for the most part, focus on Scope 1 and 2 emissions, with some positive impact to date i.e., overall sector energy emissions have reduced in these key areas (but with great variability between institutions) [see 7]. Yet the majority of HEI emissions are Scope 3 in nature, whether calculated through a consumption-based carbon footprint methodology or the emissions-based methodology used by most institutions [8]. And while actions on Scope 3 emissions are without doubt taking place, interventions are arguably, and indeed inevitably, more piecemeal given that Scope 3 covers a wide array of areas such as institutional procurement and staff business-related travel [9].

Still, Scope 3 emissions are vital to achieving HEI sustainability goals and need to include both staff and student practices such as travel to and from campus [8]. While no doubt challenging to measure and address, these are nonetheless important facets of a whole-institutional environmental impact assessment: a topic which, to date, has not received the attention it warrants in the ‘greening the campus’ literature [10]. One reason may be because it is assumed the most effective way to include students in HEI sustainability goals is through focussing on what takes place in the classroom i.e. the content of teaching and formal curricula. Yet, research suggests that most of the environmental impact students have on campus and during their studies takes place outside the classroom [11], which suggests a need to focus on student practices while at an HEI. This is backed up by data that shows that, in their daily lives outside of the classroom, students do not always have lower ecological footprints than that of the general population [12, 13]. In short, many are consuming and using resources at globally unsustainable levels. Finally, while the ‘cascade effect’ arguments are not without merit, there is compelling evidence for an unclear, weak, or in some cases non-existent positive correlation between students’ sustainability behaviour and exposure to classroom-based sustainability-related higher education [14, 15]. This latter point is yet another example of the well-known ‘value-action’ gap [16, 17] found across a myriad of ages, populations, and issues in relation to the links between environmental values, knowledge, and practices. As such, to assume that exposure to sustainability teaching at university creates ‘eco-responsible citizenship [18: 92] via

revamped curricula is problematic and not a solid foundation to base HEIs' environmental and resource-saving credentials upon.

How then can HEIs go about addressing the Scope 3 emissions of its student body, both during students' tenure at an institution and beyond? This paper explores this question, outlining a case study at the Welsh HEI Cardiff University, where students' borrowing and repairing practices outside of the classroom were researched through an online survey to explore potentially establishing a Library of Things (LoT) and/or a Repair Café (RC) within the institution. The survey research provided critical baseline information about the both the feasibility of setting up a LoT and/or RC within the institution, alongside current student practices. Although research does exist about the latter, this work mostly focuses on issues such as food [19, 20] or behaviour related to a curriculum-based project [21]. As such, the aim of this paper is to report the project results, and to stimulate further debate, research, and action into this topic.

In doing so this paper begins by discussing existing literature about the relationships between education, age and pro-sustainability behaviour, followed by considering what this literature tells us about possibilities for the 'circular campus'. Then the Cardiff University project and methods are introduced followed by discussion of the survey findings. The paper concludes by drawing implications from the survey results, in particular the need for forms of 'activist learning' around circular practices to become institutionally embedded in student on-campus student experiences.

Greening Students and the University: Lessons from the Literature

Gen Z and the Education – Action Gap

Last year, the World Economic Forum declared that 'Gen Z cares more about sustainability than anyone else' [22, 23]. Here, some assert that young adults are 'the most promising part of the population' in terms of supposedly having more environmentally friendly practices like the sharing of resources, particularly via digital platforms' [24: 1]. In short, Gen Z are argued as primed for the uptake of the sharing economy—defined 'as a commercial or non-commercial peer-to-peer model facilitated by an intermediary'—given many generational features e.g., technological literacy, concern about the environment etc. [25: 430].

Upon closer inspection, however, the veracity of such claims are open to question. For one, the research Wood [22] reports on shows that Gen Z-ers do indeed have the highest stated concerns (75%) about the sustainability of their purchases when compared to other generations. However, the data also shows that these other generations are not far behind Gen Z, with Gen X at 73% and Millennials at 71%, meaning any generation effects are arguably marginal. Other research shows the 'Thunberg effect'—e.g., being more likely to feel efficacious in addressing, and more likely to take action about, climate change—crosses the generations [26] and cannot just be attributed to younger adults alone. Indeed, other work suggest that it is in fact the 'Baby Boomers' generation that are more likely to agree that their lifestyles must change in the face of climate change and biodiversity loss. At the same time, while Gen Z-ers are more likely to state a willingness to make personal lifestyle changes, they are also more likely to feel that they can have little impact in tackling climate change [27] with these low levels of self-efficacy occurring alongside rising levels of 'eco-anxiety' [28]. As such, any popular discourse that assumes the young adults

of today will segue seamlessly into the environmental champions and resource sharers of tomorrow requires greater empirical scrutiny and critical interrogation.

When it comes to Gen Z behaviours results are also mixed. There is certainly evidence that Gen Z-ers have higher awareness of, and concerns about issues that relate to their own consumption practices, such as the negatives sides of fast fashion and the need for more ethical / sustainable clothing [29]. However, there is also work that shows how Gen Z individuals are having lesser engagements with pro-environmental behaviour compared to other generations [30, 31]. For example, Rabiou and Jaeger-Erben [32] explore the uptake of ‘circular economy’ consumption practices, where the circular economy is understood as a shift from ‘linear’ systems of production and consumption to more circular (e.g., repairing, remanufacturing, and reusing), efficient, and regenerative systems. Their work argues that, in fact, younger generations are choosing to replace products more often than older generations, even when retention, repair and/or reuse could offer similar outcomes in relation of functionality.

This trend can also be found in data from the 2022–23 National Survey for Wales, where Cardiff University, the case study HEI in this paper, is situated. This survey is a quadrennial Welsh Government-led survey that asks 12,000 inhabitants of Wales for their responses to a range of issues [33]. In the most recent survey [34] when asked whether they had clothing repaired in the last year, the age group of 16–24 returned the lowest ‘yes’ response rates. In this survey—plus the previous two in 2014 and 2018—a question on household repairs produced similar trends, with the youngest demographic group consistently reporting the lowest levels of household item repair: with the exception that, in the 2022/23 survey, young adults returned the *second* lowest level of household item repair after the 75+ age group.

This adds weight to the arguments that although Gen Z-ers are also more likely to partake in Sharing Economy practices e.g. clothes rental services [35], it is still unclear if such practices are displacing or actually adding to Gen Z’s over-all material consumption levels, including the creation of direct and indirect rebound effects [36]. As such, a picture is emerging of young adults, particularly in the Global North, many of whom are aware and concerned about the environment, sustainability, their own resource use and climate change: but are not often translating that awareness in action, with some commentators noting the continued and, in places, rising high levels of consumerism and wastage amongst this cohort [37–39].

Does this above pattern also hold for attendees at HEIs, who are most often young adults in the age 18–25 age bracket [40]? Some research does suggest that, when compared to people of the same age not in full or part-time studies, HEI attendees do have a significant positive association with commitment to environmental sustainability [41]. This has led some to argue that ‘more highly educated individuals... are more motivated to engage in environmentally responsible behaviour since they are better aware of the damage’ [42, 14] shows that there is weak evidence of a relationship between higher education achievements and sustainability behaviour. Here, different studies return varied results as to whether sustainability behaviour is positively related to exposure to sustainability-related higher education or not. In addition, measures of student ‘environmental footprint’ show varied results. For example, students from universities in the Philippines and Spain have lower environmental footprints than the national average [12, 13] whilst those in China are higher but are still much smaller than students in the Global North [11]. Differences in results across such studies are contingent upon many variables such as personal, institutional, and country-level contexts. For one, studies exploring correlations between socio-demographic factors and resource use have highlighted the role that gender, and income

can play [43]: findings that highlight a complex picture where individual levels and forms of education are just one factor in influences on sustainability practices.

That said, although overall results are inconclusive, when specific practices / sectors are focused on—e.g., relationships between education, diets, and greenhouse gas emissions—clearer relationships are apparent. One study shows that low-emitting diets are more likely to be consumed by women, and also correlate with levels of parental education [44]. Critically, the Spanish research cited above—that looks at correlations between student environmental values and actions measured as an Environmental Footprint (EF)—concludes that:

‘Those students who presented less sustainable consumption according to their calculated EF were the same ones who reported having a more pro-environmental attitude. This indicates...that universities, apart from promoting sustainability knowledge, should impact on changing behaviours and mindsets amongst students.’ [13: 10].

This paper aims to offer further evidence to support the above assertion. That is, while HEIs may be playing an important role in fostering ‘tomorrow’s leaders, managers, scientists and teachers...to address the challenges of sustainability’ [1, 45] both during students’ time studying [46] and once graduated [15]. This point matters for several reasons. First, if HEIs are to address all aspects of institutional Scope 3 emissions, the consumption practices of students should be included. Li et al.’s [11] calculations show that the majority of the environmental impact of Shanghai-based student behaviours occurs outside the classroom, with 65% of emissions attributable to daily life and 15% to academic activities. This is not surprising, given that most student time is spent—and consumption-related behaviour undertaken—outside the classroom, although this will vary given the subjects studied e.g., whether a programme includes laboratory work or long-distance travel to a field site. Second, once graduated, the biggest environmental impact that most alumni have during their lives is through their everyday consumption practices. This is because ‘Household consumption contributes to 72% of global greenhouse gas emissions’ [47–49]. Taken together, all these factors underscore the need for HEIs to think and act critically and urgently, to enable the reality of their graduates’ resource-use practices to align more closely with the ambitions the fostering of tomorrow’s ecological citizens. The next subsection picks up on this point, exploring research into current efforts to address on-campus resource consumption.

Addressing Scope 3 Emissions at HEIs

HEIs are now taking a wide range of actions to address environmental imperatives in and beyond the campus. For one, there are numerous ‘Green Campus Initiatives’ where students and staff are ‘encouraged to reflect on the values of sustainability and adapt their daily actions to attend sustainability initiatives and objectives’ [50, 10]—the indirect emissions that occur throughout the value chain of the reporting organization [51]. This is vital as Scope 3 emissions account for at least 60% of total emissions in the HEI sector, in the UK at least. In addition, they are often the most visible and tangible parts of everyday HEI experience e.g., travel options available, catering provisioning and food waste management: important given arguments about the power of the ‘hidden curriculum’. That is, how the visible but taken-for-granted structures, practices and norms signal to staff and students key institutional and societal values, alongside enabling certain behaviours over others [52].

Alongside the Green Campus agenda, more recently the principles of the Circular Economy are being brought into HEI sustainability and Net Zero goals e.g., see Liverpool University's sustainability projects of the past few years [53]. Here, the possibilities for the 'Circular University Campus' [54] are discussed, with some arguing that 'the campus offers itself as an ideal testing ground for the development and implementation of social and technological innovation' [55, 56] has detailed how this agenda is progressing, profiling 68 HEIs taking action on the Circular Economy (56 of which are in Europe or North America). Here, they show the key areas have to date been research, procurement, and education, with the latter topic receiving the most attention across relevant institutions [18].

What is receiving less attention within the Circular Campus agenda and debate are on-campus actions that aim to deliver tangible circular economy impacts to student practices and change 'visible cultures' [1]. One example is the Southampton University (UK) Students Union 'Shift Your Stuff' scheme, which was an end-of-term project that collected and redistributed unwanted student possessions [57]. In addition, the worldwide Repair Café movement has several of their 2800+ cafés set up within, or at least in alliance with, HEIs such as at Griffith University (Australia) and Deltion College (Netherlands). This is noteworthy as data on the impact of Repair Cafés show they can be effective ways to reduce material waste. For example, data collected from a sample of 254 Repair Cafés shows that 62% of 71,487 recorded items brought in were successfully repaired, with a further 13% partially repaired [58]. Work into the environmental impact of Repair Cafés has suggested that they thus can serve dual purposes in environmental impact. First, through direct impact as spaces that facilitate individuals reducing their waste and increasing product lifespans. This is supported by a scoping report on 13 UK Repair Cafés which suggests that an average of 10 kg of CO_{2e} could be saved for every 1 kg of products successfully repaired [59]. And second, through indirect impacts, such as helping to foster and shape wider environmental debates about planned obsolescence and product reparability and longevity [60] e.g., as part of the 'Right to Repair' movement, which has started to have noticeable impact [61].

As such, there is arguably more that can be done in this space, given that there are only a handful of Repair Cafés in HEI institutions around the world. Alongside repair, the often spatially-proximate nature of HEIs (e.g. on purpose-built campuses or as part of existing cities and towns) means that:

'Universities have all the necessary infrastructural conditions for the implementation and demonstration of sharing projects and their sites can become a driver for the further development of the sharing economy.' [24: 19]

Yet, to date, there is little in the relevant literature, or on websites like the Ellen MacArthur Foundation, on the topic of student non-classroom-based practices at HEIs. That may be because such projects are deemed tangential to the core business of HEIs and/or that HEIs entering into the 'personal space' of students' lifestyles is deemed problematic, even though many live on campus and/or in HEI owned residences. Whatever the reason, the pilot project reported on in the remainder of this paper was driven by the ethos that—those arguments aside—more can and should be done to embed everyday sharing and repairing circular practices into the student experience, not just for resource-saving reasons but also because of the links found between the creation of communities of practices like Repair Cafés, and increased participant well-being. Indeed, published literature has demonstrated the value of community repairing practices as a means to improve social cohesion between users and volunteers [62, 63] e.g., a university campus-based repair café can function as a positive meeting space for students, university staff and neighbouring residents [64].

Additionally, engaging with repairing practices, particularly in a collaborative space, has been shown to facilitate individuals developing a range of ‘lost skills’ through the Repair Café approach of hands-on learning, where the repairer and visitor engage with the repair project collectively [60]. This can result in individuals gaining a range of technical repair skills. More critically, such processes can help to shift the relationship between users and their consumer goods, with the former regaining some control over their products through the ‘power to repair’ [63, 65].

Alongside Repair Cafés, the Cardiff University project reported herein explored the feasibility of setting up an on-campus ‘Libraries of Things (LoT) which is broadly understood as a publicly accessible collection of ‘borrowable and returnable’ non-perishable items that can include tools, children’s toys or kitchen gadgets [see 66]. There is comparatively little research into LoTs compared to Repair Cafés [67], but what does exist shows that users are motivated by mix of economic, social, and environmental values: and that borrowers often report they ‘felt better connected to their community because of engaging with the scheme’ [68: 9].

Taken together, these reported positive social and material impacts of various ‘circular practices’ suggests definite scope, and arguably the need, for HEIs to foster more student-focused circular economy behaviours, to help deliver tangible social and material benefits as part of broader sustainability agendas. In response, the remainder of this paper aims to contribute to the above literature, providing much-needed insight into the current borrowing and repairing practices of HEI attendees, as well as their willingness to shift their practices in the future.

Research Methods

Cardiff University is one of eight universities in the country of Wales, based in the capital city of Cardiff, with a student population of over 30,000 and staff of approximately 6,000. In 2022, competitive internal funding with the title of ‘Innovation for All’ became available to staff, and this paper is based upon one project funded under this scheme called ‘Sharing and repairing: exploring the Circular Economy in the Higher Education Context’. The aims of the project were to explore the feasibility of establishing a student-led Repair Café (RC) and/or Library of Things within the institution. To that end, the project partnered with RC Wales (RCW: see <https://repaircafewales.org>) and Benthg Cymru (BC: see <https://www.benthg-cymru.org>). The latter translates from Welsh to mean approximately ‘Borrow Wales’ and aims to establish a network of Libraries of Things in Wales, of which there are currently 27.

Both organisations were key to the project from initiation to completion, having had experience of attempting to engage students across in borrowing and repairing practices. For example, there is a RC in Cathays, Cardiff: a suburb located adjacent to the central the University campus area with a very high student population. This means that students at Cardiff University have access to this RC if they wish. However, historically, there has not been a notable student uptake of this RC, in terms of both users and volunteers. In addition, there is currently no Benthg within a Welsh HEI, despite the fact that there are approximately 133,000 students studying across the eight HEI institutions in Wales.

Overall, the project consisted of three key stages. First, an online questionnaire was distributed to all enrolled undergraduate and postgraduate Cardiff University students. Second, a series of semi-structured qualitative online interviews was undertaken with key staff at UK and Irish HEIs who work in the field of sustainability, to explore the variety

of institutional practices and experiences in ‘greening’ the campus. Finally, a free sewing repair workshop for any interested Cardiff University students was held in April 2023 with 15 attendees. This paper draws primarily from the first stage: the online questionnaire.

The online survey was co-produced by the authors with RCW and BC partners. This team worked through three iterations of the survey, drawing on our shared experience and knowledge of correct terminology; of existing surveys of non-student users undertaken by RCW and BC; and the key questions that we needed to answer, to address the project questions as set out in the funding application. The finalised survey was constructed in Microsoft Forms and used a mixture of Likert-scale based questions, preference ranking and open text responses (see Appendix 1).

After receiving Cardiff University Research Ethics approval, as well as institutional approval to distribute the survey amongst students, the questionnaire was distributed electronically between November 2022 and February 2023. It was shared online through several networks. Initially, it was distributed to the managers of each of Cardiff University’s 24 academic schools, then circulated on social media through Microsoft 365 Cardiff University Yammer platform, which students have access to via university emails. The invite to participate was also posted on Twitter, and on student Facebook groups: and posters with a QR code were produced and placed in high-traffic areas on campus, with the research team speaking in a selection of lectures to make students aware of the research. Finally, the questionnaire was separately distributed in Qualtrics format on a school-platform in the School of Psychology, where students are expected to complete surveys as part of their research training. The final total number of responses was 383 completed surveys. This data was then analysed using Microsoft Forms results function, as well as through manual analysis in Excel, where both the quantitative and qualitative data was examined. The latter took the form of responses to ‘other’ text boxes in the survey, which gave students the space to put answers into their own words. The discussion below draws on both forms of data, outlining the main themes to arise from questionnaire responses.

Informal Practices and Barriers to Action: Cardiff University Survey Results

What Students Borrow, from Whom, and Barriers to Borrowing More

As discussed in “[Gen Z and the education – action gap](#)” section, it is often assumed that young adults are well-suited to adopting more circular / sharing initiatives than the general population for several reasons. For example, they already display divergent consumption patterns from preceding generations e.g., less likely to own a car [69, 70]. Their use of digital platforms and social media, combined with high levels of digital literacy, mean they are familiar with varied means of accessing borrowing services that claim to foster forms of collaborative consumption and sharing principles [70]. As such, some argue there is a ‘a natural fit’ between current Gen Z-ers and circular economy initiatives [21].

The results of the Cardiff University survey do offer some supporting evidence for such arguments. For example, among the questionnaire respondents there are a range of borrowing and repair practices already taking place. This may not be surprising, given the life stage of most of the students who filled in the survey. Here 77% were between the ages of 18–21, with a further 12% aged 22–25. In addition, 87% stated that they were partaking in undergraduate study – a cohort that typically does not have a great deal of disposable

income in comparison to their non-student peers and the UK working population in general [71]. Thus, one may expect such individuals to be borrowing, sharing, and keeping in use through repair at least the some of their possessions. Or as one student put, in response to the survey question about why they might make use of formal borrowing opportunities like Benthgy: ‘My main reason in the past was for the environment, but now it is about money’: a motivation found amongst broader users of sharing economy services [72].

In addition, only 7% of respondents were living in a family home, with the rest residing in student housing i.e., either university halls or a house-share with peers: data not dissimilar to UK-level figures [73]. Such living situations can naturally lend themselves to the pooling of resources alongside the sequential borrowing of singular items, which showed up in the questionnaire data. For example, 13 respondents mentioned pooling as a norm e.g., ‘my housemates and I share appliances and devices between ourselves like the TV, speakers, microwave, toaster etc.’. As the survey did not explicitly ask about household and peer resource-pooling, this number is quite likely an underestimation, with other pooled items listed by participants including a car, and clothes.

In addition, different interpretations of what is means to ‘borrow’ came into play – a point already recognized in research on the sharing economy [74]. Some respondents listed fungible items i.e., those used up but are replaceable by an equivalent item, such food and drink ($n=36$), either as a general category or through providing specifics e.g., ‘bread, milk, onion, alcohol’, ‘paracetamol’ and ‘Sellotape’. A total of 32 students listed ‘money’ as having been borrowed. Notable here was how the reference to borrowing money often came with a short explanation e.g. “I borrowed money from my mum to pay something and then payed (sic.) it back later and did the same with friends” – the sort of short narrative missing from, for example, respondents who mentioned borrowing a jumper or a food processor, which potentially points towards a different moral economy around borrowing money. However, it does appear, that for the most part, items borrowed were single possessions sequentially lent from one person to another and then (presumably) returned to the original owner. Such patterns speak to sociological work into the ‘messy social lives of objects’ [75] which suggests that some items may take more circuitous routes than others through a series of users due to the complex ‘churn’ of materials in everyday lives [76]. Here, daily socio-material relations do not automatically mirror the transactional bent of more formal sharing practices, as items may circulate between multiple housemates for example, or move from being borrowed to being pooled and back again (or not).

In survey responses, the most commonly listed items borrowed were clothing, shoes and bags ($n=264$); home appliances and tools ($n=224$); beauty products and beauty appliances ($n=104$); electronics ($n=98$); and study aids e.g., pens, paper ($n=67$). In-keeping with the points above about the living situations and relatively low disposable income for this cohort, the vast majority of borrowing is taking place within family and friendship circles, which can be classified as non-monetary ‘traditional sharing’ [74] i.e., 90% of participants stated they ‘often’ or ‘sometimes’ borrowed from friends and family. By contrast, only 5% ‘often’ or ‘sometimes’ borrowed from a LoT or equivalent; with 2% using borrowing apps; and 6.5% borrowing items via social media platforms.

The reasons for this seemingly low uptake of formal sharing mechanisms by students need to be put into a broader context. For one, research suggests that barriers to formalized sharing mechanisms entry for Gen Z ‘are very real and include knowledge and price [77]. In the Cardiff University survey, when asked what factors would deter participants from using a borrowing service such as Benthgy, the results were as shown in Fig. 1.

To break this down, the top issues students chose to rank first were that it is not easy to return or collect things (i.e., convenience: 30%); that they prefer to own things (27%);

and that they are unfamiliar with the LoT concept (i.e., ‘knowledge’: 21%). For the factors ranked second, these three choices were still the most popular, with 23% selecting ‘convenience’ as a deterrent: and the same percentage choosing ‘prefer to own things’ as their second ranked deterrent. A further 22% ranked lack of knowledge as their second most important factor, with 14% choosing ‘prefer to buy new’.

In the comments section for this question, other issues that are stated as barriers to borrowing were brought up by students. This included cleanliness of the borrowed product, with nine students citing this as an issue and one commenting ‘The things may not be cleaned properly and have germs or dirt on’. A further two cited concerns about the who is responsible for maintaining the quality of the item, and what happens when it breaks e.g. ‘In case I break it, consequences could be too costly’ - all issues that appear in the literature about public perceptions of, and engagements with, facets of the sharing economy outside of a student cohort [78].

These findings resonate with the extant literature about barriers to the Sharing Economy for a broader population. For one, an LE Europe et al. [79] report drew on a sample of over 12,000 people across 12 European countries, and showed that, although there was a stated willingness to engage with circular economy practices, actual engagement was ‘rather low’ e.g., over 90% had no experience renting or leasing products. The reasons for this are found to be lack of consumer awareness and interest [80] with other barriers to the uptake of e.g., borrowing items echoing those well-established in the literature, such as trust, functionality, ownership and perceived lack of economic advantage [81]. For Cardiff University survey respondents, it was the potential money saving that was reported as the main driver that could encourage the use of further borrowing practices. Here—when students were asked to rank the key drivers of saving money, being environmentally-friendly, having access to goods they do not own, saving space, developing new interests and any ‘other’—67% ranked saving money as first, with 10% stating environmental motivations. That said,

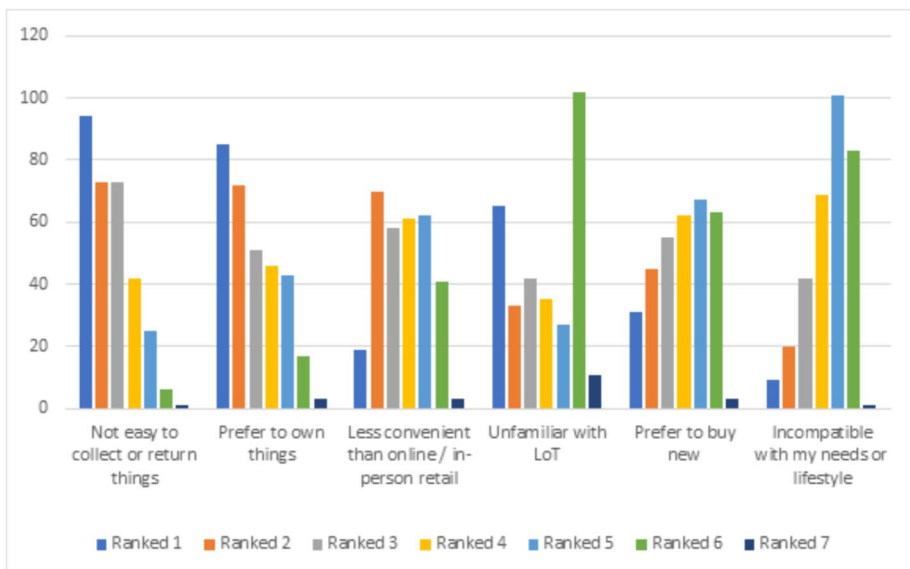


Fig. 1 Number of responses (vertical axis) to Question 8: ‘Please rank, in order of importance, the factors that would make you NOT want to use a ‘library of things’

the latter issue was the most popular second ranked statement, with 31% choosing environmental motivations, with developing new interests (24%) and saving money (19%) being the next popular second ranked choices. Again, this resonates with the broader literature around motivations, suggesting that students are not displaying distinct characteristics from the broader population at large.

Student Repairing Practices and the Appetite for Learning More

Do the results differ when it comes to reported student repairing practices? In many ways, a similar picture emerges of definite repair practices taking place, facilitated by informal networks and personal relationships. When asked what items they had had repaired in the past 6 months, the most commonly listed objects were clothing and textiles (30%) and electronics (22%), followed by furniture /household goods (18%) and jewellery (5%). Some showed a clear propensity towards repair as a default practice, with one student commenting 'I try and repair first before replacing. In the last 6 months I've repaired mum's laptop and dishwasher, my bike, housemate's bike, smartphone (battery) and boot catch on my car'. When asked who was doing the repairing 66% said they 'sometimes' or 'often' repaired objects themselves, whilst 80% said they 'sometimes' or 'often' had help repairing objects from friends and family, showing that a notable proportion of the repair taking place was not completed by the participants themselves. Along similar lines to the borrowing data, when asked if they had objects fixed at a RC or similar community-based organisation, 82% responded 'never', with only 5% saying 'sometimes' or 'often'. Finally, some students were making use of fee-paying professional repair services, with 46% saying they 'sometimes' or 'often' got things fixed this way, with only 15% saying that they 'never' did.

And as with the borrowing practices, issues of convenience and knowledge were key here. Figure 2 shows that a total of 65% of respondents ranked first the issue of either not knowing the location of their nearest RC, or not understanding how it works. If ones adds the issue of 'limited hours' (arguably a key part of convenience), a total of 75% of respondents ranked these issues as the second most important deterrents for making use of a local RC.

In terms of the factors that would encourage students to make use of a local RC, the results can be seen in Fig. 3. Here, the top factors were if the practice was an affordable alternative to buying a replacement, and if doing so helped reduce their environmental footprint. Here, a total of 74% ranked these issues first, and 45% ranked them second. Notably, making access to an RC more convenient did not feature strongly, with only 4% putting this at their top-ranking issue, and 68% ranking this either fourth, fifth or sixth. At first glance, this result does not line up clearly with the findings in Fig. 2 above, where issues of convenience play a central role. However, as discussed above, young adults are today often attuned to issues of environmental concern, in terms of stated and attitudes. Therefore, asking a direct question about environmental impact—as shown in Fig. 3—may have evoked in respondents a different set of values than the previous items listed in Fig. 2.

Figure 3 also highlights how the retention of valued objects and meeting members of the local community matter to some respondents, with a similar number of students (between 23 – 26%) ranking the former issue either second, third or fourth. It is notable that over half (56%) the students ranked 'meeting the community' towards the bottom: a finding that goes somewhat against the grain of existing literature on repair spaces and cultures, that emphasize the social aspects of such groupings and practices (see above). However, this result could speak to the specific nature of a student cohort. For one—unlike some other countries where students are likely to attend a HEI in the area of their upbringing / family home—in the UK,

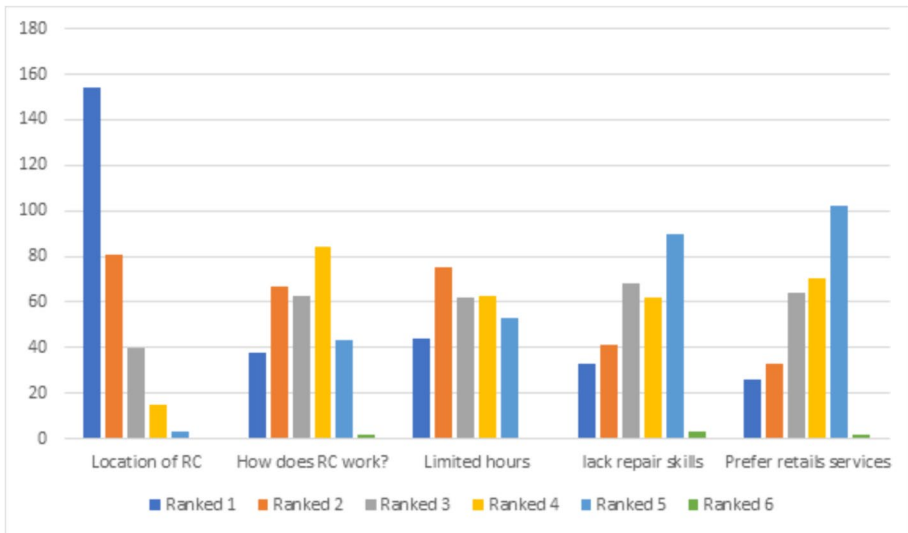


Fig. 2 Number of student responses (vertical axis) to the survey question: 'Please rank the below statements in order of how influential they would be in discouraging you from using a Repair Café (or similar community-based organisation)'

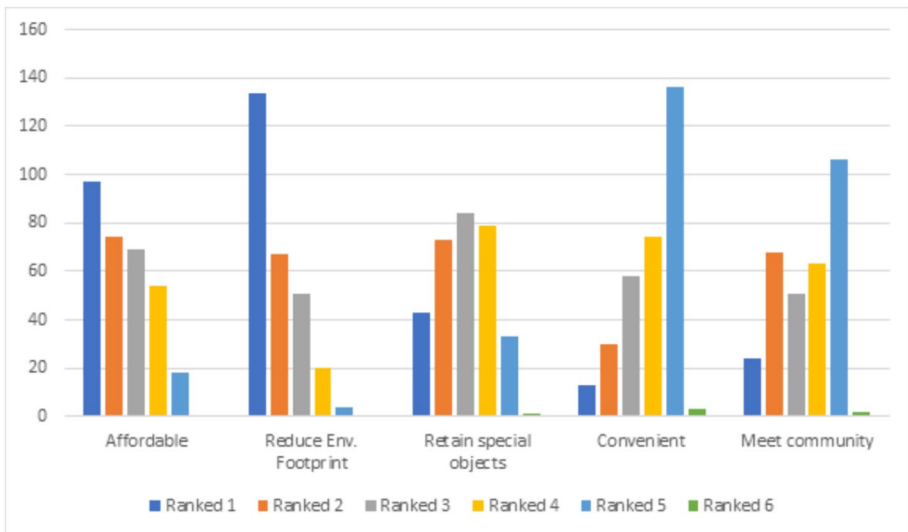


Fig. 3 Number of responses (vertical axis) to the survey question: 'Please rank the statements in order of how influential they would be in encouraging you to use a Repair Café (or similar community-based organisation)'

just over 80% of full-time students leave the family home to study [73]. This creates HEIs and surrounding areas with high student densities and transient populations, where there is little mixing of 'locals' and 'students': sometimes referred to as the 'town' and 'gown' divide [82].

This survey result could also arise from the fact that, as most of the questionnaire respondents had never made use of a RC, they were not aware of its social aspects. That said, for those few respondents who did think community matters, they made comments such as ‘I much prefer to share rather than own. It makes things more valuable in the same sense that a library enriches a community more than a bookshop or private bookshelf’.

And finally, there was a clear appetite amongst respondents for further skilling up in certain repair practices. Here, participants made comments such as ‘I’d like there to be a simple level of home maintenance checklist available, toilet flush when it goes wrong’: and ‘I would like to learn more about clothing and furniture repair, I have some knowledge but accessing sewing machines and tools is difficult, and I can’t justify the cost’. Although brief, such comments give valuable insights into the repair skills some students would like to develop, alongside the barriers to doing so, which includes accessing the often-specialized equipment to undertake specific repairs. In short, there is clear potential to foster more circular practices amongst respondents, with the questionnaire data illuminating some of the barriers to student participation.

Conclusions: Embedding Circularity into the Student Experience

This paper has outlined how, at Cardiff University at least, students display attitudes towards borrowing and repairing that strongly mirror those of broader populations as captured in the existing literature [e.g. 79]. While this pilot exercise certainly requires repeating and validation from other student cohorts across a wide array of HEIs, it points towards a need to critically interrogate assumptions that a ‘Sustainability Generation’ [83] of current HEI students feel able and willing to take up forms of circular economy practices such as sharing and repairing. As such, this paper argues that ‘education for sustainability’—and specifically, more recent discussions of the ‘Circular University Campus’ [84]—need to take seriously the imperative not just to teach students about sustainability in the classroom, but to facilitate experiential skills-based learning that challenge taken-for-granted socio-material relations outside the classroom [85] and extend the sustainability competencies students currently graduate with.

This paper presents a picture of young adults, borrowing, sharing and repairing amongst friends and family but not engaging in any substantive way with the more formalised platforms and spaces of the sharing economy. In addition, personal ownership of goods is still important to the questionnaire respondents, and the many barriers for entry into circular economy practices—outlined in detail in a literature that mostly focuses on older adults and smaller households—are echoed in the questionnaire survey results.

One response may be to assume and/or hope that as these young adults move into later life stages—and their living and financial situations change—they will be more likely to share and repair more formally, as the opportunities to carry on their current informal sharing and repairing diminish (e.g. less likely to be living in multi-occupancy student houses or flat). But there are some important points to note here. Early adulthood is identified as a critical point in the development of sustainable behaviours: a stage in which ‘behaviours and practices can become formed’ [86:119] through this period of transition and socialisation. This applies to the norms of how one consumes and uses various material cultures which includes the development of a ‘consumer identity’, with some arguing that ‘learning to consume’ is one of ‘the deepest educative process... of the twentieth century’ [87: 182].

As such, this data suggests young adults do wish to borrow and repair more: but still value personal ownership and convenience over borrowing or repairing key items. In addition, one cannot assume that any propensity to share and repair amongst one's own informal networks—clearly shown in the Cardiff University data—will segue easily and spill-over into broader sustainability practices at a later date. Research underscores that even those who already undertake some forms of borrowing practice are not easily persuaded to extend this behaviour to other household items [72]. As such, any belief that early adult resource-pooling naturally develops into later life formal sharing has little evidence to back it up.

What, then, are the roles of HEIs, in enabling students to live less environmentally deleterious lives while at university and once graduated? Clearly, there is no desire for students to feel that they are being told how to live and behave outside of the classroom, particularly as young adults for many of whom (in the UK at least) it is their first time living outside of the family home, and many of whom are already facing multiple pressures including the impacts of the recent 'cost of living' crisis in the UK [88]. Neither should students feel that they are being held responsible for the larger systemic failings that have become deeply normalised in high-consumption societies such as the UK e.g., the short-life spans of many consumer goods [89]. Instead, young adults require specific consideration of the drivers and norms that are helping to shape their practices [90]. In a HEI setting, this could take various forms including 'activist learning' to enable students to play important roles in transformative change: not just through the careers they go into once graduated, but also how they display forms of broader ecological citizenship. Here, activist learning can be understood as:

'a strategy for generating sustainability competencies that encapsulate the knowledge, understanding, skills, values, and attributes that allow learners to contribute to a more sustainable future through engagement and leadership in (broadly defined) community activism' [91: 16].

Indeed, in the free sewing repair workshop, which was attended by 15 students, participants talked about wishing they were able to use some of their time at university to develop more life skills such as repair, underscored by the desire to be more self-sufficient in e.g. being able to repair important possessions such as backpacks, or items with high-use e.g. jeans and leggings.

As such, there was a definite constituency of students able and willing to become 'activist learners', which backs up this paper's goal, of arguing a case for making repairing and sharing practices a key part of such activist learning in HEIs. This paper presents some initial evidence that student repairing and sharing has the potential to play an important role in the 'Circular Campus'. Indeed, if Circular Economy agendas for HEIs are to have any merit in practice, they require a whole-system approach [55]. This of course includes altering the material flows through an institution, which practices of repair and borrow can help address. But it also includes questioning and reconfiguring the embedded and 'hidden curriculum' norms and practices of e.g., learning about sustainability in the classroom but not having these lessons connected to the forming of important practices of material and resource use, which will constitute the majority of an individuals' environmental impact over their lifetime. As such, making students central to on-campus 'repair cultures' is both important to HEIs' Net Zero Scope 3 emission reductions plans, as well as part of deeper, systemic transformations that HEIs must play a key role in, as form of civic mission and community activism [92].

Authors' Contribution Kersty Hobson was the PI on the research project reported on herein. She co-designed the survey instrument used in the research and undertook the data analysis for the survey reported on here. She completed the first full draft of the paper, followed up by subsequent revisions and final edits.

Megan O'Byrne was the research assistant on the research project reported on herein. She co-designed and distributed the survey instrument used in the research through all mentioned channels. She assisted in completing the first draft of the literature review section and contributed to the final revisions and edits of the full paper draft.

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Declarations

Ethical Standards This research involved human participants and received approval by the School of Geography and Planning (Cardiff University) Human Ethics Committee. All research participants gave informed consent for their participation and for their anonymous data to be published in a peer-reviewed article.

Competing Interests The authors do not have any financial or non-financial interests that are directly or indirectly related to the work submitted for publication.

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References

1. Adams R, Martin S, Boom K (2018) University culture and sustainability: Designing and implementing an enabling framework. *J Clean Prod* 171:434–445. <https://doi.org/10.1016/j.jclepro.2017.10.032>
2. Breadsell J, Minunno R, Breadsell J (2021) How can Universities Transition to Net Zero? In ASA Symposium Building a Future towards Global Net Zero (ANZAScA), 2 December 2021. <https://espace.curtin.edu.au/handle/20.500.11937/86787>. Accessed 10 November 2023
3. Mcmillin J, Dyball R (2009) Developing a whole-of-University approach to educating for sustainability: linking curriculum, research and sustainable campus operations. *J Education Sust Devt* 3(1):55–64. <https://doi.org/10.1177/097340820900300113>
4. Latter B, Capstick S (2021) Climate emergency: UK universities' declarations and their role in responding to climate change. *Front Sust* 2. <https://doi.org/10.3389/frsus.2021.660596>
5. Petrović N, Ćirović M, Martins FP (2023) The Role of Higher Education in Transition to a Circular Economy: Journey on the "Yellow Brick Road" to Sustainability. In: Obradovic V (ed) *Sustainable Business Change: Project Management Toward Circular Economy*. Springer International Publishing, Cham, pp 3–39
6. Cardiff University (2021) Environmental Sustainability Strategy Recast 2021. <https://intranet.cardiff.ac.uk/staff/documents/2501699-environmental-sustainability-strategy-recast-2021>. Accessed 18th August 2023
7. Amber KP, Ahmad R, Chaudhery GQ, Khan MS, Akbar B, Bashir MA (2020) Energy and environmental performance of a higher education sector—a case study in the United Kingdom. *Int J Sust Energ* 39(5):497–514. <https://doi.org/10.1080/14786451.2020.1720681>
8. Ozawa-Meida L, Brockway P, Letten K, Davies J, Fleming P (2013) Measuring carbon performance in a UK University through a consumption-based carbon footprint: De Montfort University case study. *J Clean Prod* 56:185–198. <https://doi.org/10.1016/j.jclepro.2011.09.028>

9. Hoolohan C, McLachlan C, Jones C, Larkin A, Birch C, Mander S, Broderick J (2021) Responding to the climate emergency: how are UK universities establishing sustainable workplace routines for flying and food? *Clim Policy* 21(7):853–867. <https://doi.org/10.1080/14693062.2021.1881426>
10. da Silva LA, Dutra ARDA, Soares TC, Birch RS, Guerra JBSODA (2023) Trends in research: carbon footprint reduction in universities as a way to achieve a green campus. *Int J Sust High Ed* 24(3):584–601. <https://doi.org/10.1108/IJSHE-10-2021-0440>
11. Li X, Tan H, Rackes A (2015) Carbon footprint analysis of student behavior for a sustainable university campus in China. *J Clean Prod* 1–6:97–108. <https://doi.org/10.1016/j.jclepro.2014.11.084>
12. Toledo-Bruno AG, Medina MAP (2016) Ecological footprint of university students: does gender matter? *Global J Environ Sci Manag* 2(4):339–344. <https://doi.org/10.22034/gjesm.2016.02.04.003>
13. Fernández M, Cebrián G, Regadera E, Fernández MY (2020) Analysing the relationship between university students' ecological footprint and their connection with nature and pro-environmental attitude. *Int J Env Res Pub He* 17(23):8826. <https://doi.org/10.3390/ijerph17238826>
14. Probst L (2022) Higher education for sustainability: a critical review of the empirical evidence 2013–2020. *Sustainability Basel* 14(6):3402. <https://doi.org/10.3390/su14063402>
15. Kountouris Y, Remoundou K (2023) Does higher education affect pro-environmental behavior? Evidence from household waste recycling in Greece. *Environ Res Lett* 18:084017. <https://doi.org/10.1088/1748-9326/ace19a>
16. Teather A, Etterson J (2023) Value-action gaps between sustainability behaviors, knowledge, attitudes and engagement in campus and curricular activities within a cohort of Gen Z university students. *J Sust Ed* 28. http://www.susted.com/wordpress/content/value-action-gaps-between-sustainability-behaviors-knowledge-attitudes-and-engagement-in-campus-and-curricular-activities-within-a-cohort-of-gen-z-university-students_2023_04/. Accessed 10th November 2023
17. Hobson K (2003) Thinking habits into action: the role of knowledge and process in questioning household consumption practices. *Local Env* 8(1):95–112. <https://doi.org/10.1080/13549830306673>
18. Serrano-Bedia AM, Perez-Perez M (2022) Transition towards a circular economy: a review of the role of higher education as a key supporting stakeholder in Web of Science. *Sust Prod Con* 31:82–96. <https://doi.org/10.1016/j.spc.2022.02.001>
19. Mahat H, Hashim M, Nayan N, Saleh Y, Haron SMS (2017) Sustainable consumption practices of students through practice oriented approach of education for sustainable development. *Int J Acad Res Bus Soc Sci* 7:703–720. <https://doi.org/10.6007/IJARBS/v7-i6/3031>
20. Herrera Burstein YE, Goñi Avila NM (2023) Promoting sustainable consumption among university students: a systematic literature review. *I J Sust High Ed*. <https://doi.org/10.1108/IJSHE-09-2022-0298>
21. Godelnik R (2017) Millennials and the sharing economy: Lessons from a 'buy nothing new, share everything month' project. *Env Inn Soc Trans* 23:40–52. <https://doi.org/10.1016/j.eist.2017.02.002>
22. Wood J (2022) Gen Z cares about sustainability more than anyone else – and is starting to make others feel the same. <https://www.weforum.org/agenda/2022/03/generation-z-sustainability-lifestyle-buying-decisions>. Accessed 18 August 2023
23. Carnegie M (2022) Gen Z: How young people are changing activism. BBC Worklife. <https://www.bbc.com/worklife/article/20220803-gen-z-how-young-people-are-changing-activism>. Accessed 18 August 2023
24. Revinova S, Ratner S, Lazanyuk I, Gomonov K (2020) Sharing economy in Russia: Current status, barriers, prospects and role of universities. *Sustainability Basel* 12(12):4855. <https://doi.org/10.3390/su12124855>
25. Martinez-Gonzalez JA, Parra-Lopez E, Barrientos-Baez A (2021) Young consumers' intention to participate in the sharing economy: an integrated model. *Sustainability* 13(1):430
26. Sabherwal A, van der Linden S Greta Thunberg effect: people familiar with young climate activist may be more likely to act. *The Conversation*. <https://theconversation.com/greta-thunberg-effect-people-familiar-with-young-climate-activist-may-be-more-likely-to-act-154146>. Accessed 18 August 2023
27. Policy Institute (King's College London) and New Scientist (2021) Who cares about climate change? Attitudes across the generations. <https://www.kcl.ac.uk/policy-institute/assets/who-cares-about-climate-change.pdf>. Accessed online 18 August 2023
28. Tseveni I, Proutsos N, Tseveni M, Tigkas D (2023) Generation Z worries, suffers and acts against climate crisis—The potential of sensing children's and young people's eco-anxiety: a critical analysis based on an integrative review. *Climate* 11(8):171. <https://doi.org/10.3390/cli11080171>
29. Gazzola P, Pavione E, Pezzetti R, Grechi D (2020) Trends in the fashion industry. The perception of sustainability and circular economy: a gender/generation quantitative approach. *Sustainability Basel* 12(7):2809. <https://doi.org/10.3390/su12072809>

30. Parzonko AJ, Balińska A, Sieczko A (2021) Pro-environmental behaviors of generation Z in the context of the concept of homo socio-oeconomicus. *Energies* 14:1597. <https://doi.org/10.3390/en14061597>
31. Ottelin J, Cetinay H, Behrens P (2020) Rebound effects may jeopardize the resource savings of circular consumption: evidence from household material footprints. *Environ Res Lett* 15(10):104044. <https://doi.org/10.1088/1748-9326/abaa78>
32. Rabiū MK, Jaeger-Erben M (2022) Appropriation and routinisation of circular consumer practices: a review of current knowledge in the circular economy literature. *Clean Resp Cons* 100081. <https://doi.org/10.1016/j.clrc.2022.100081>
33. Welsh Government (no date) National Survey for Wales. <https://www.gov.wales/national-survey-wales>. Accessed 30 October 2023
34. Welsh Government (2023) Building skills and transforming lives through repair and re-use. <https://www.gov.wales/building-skills-and-transforming-lives-through-repair-and-re-use>. Accessed 13 October 2023
35. McCoy L, Wang YT, Chi T (2021) Why is collaborative apparel consumption gaining popularity? an empirical study of US gen Z consumers. *Sustainability Basel* 13(15):8360. <https://doi.org/10.3390/su13158360>
36. Castro CG, Trevisan AH, Pigosso DC, Mascarenhas J (2022) The rebound effect of circular economy: definitions, mechanisms and a research agenda. *J Clean Prod* 345:131136. <https://doi.org/10.1016/j.jclepro.2022.131136>
37. Williams A, Hodges N (2022) Adolescent generation Z and sustainable and responsible fashion consumption: exploring the value-action gap. *Young Consumers* 23(4):651–666. <https://doi.org/10.1108/YC-11-2021-1419>
38. Escario JJ, Rodriguez-Sanchez C, Casaló LV (2020) The influence of environmental attitudes and perceived effectiveness on recycling, reducing, and reusing packaging materials in Spain. *Waste Manage* 113:251–260. <https://doi.org/10.1016/j.wasman.2020.05.043>
39. Lazaric N, Le Guel F, Belin J et al (2020) Determinants of sustainable consumption in France: the importance of social influence and environmental values. *J Evol Econ* 30:1337–1366. <https://doi.org/10.1007/s00191-019-00654-7>
40. Higher Education Statistics Agency (2023) Who's studying in HE?, HE Student Data – personal characteristics, <https://www.hesa.ac.uk/data-and-analysis/students/whos-in-he>, Accessed 15 October 2023
41. Cotton DRE, Alcock I (2013) Commitment to environmental sustainability in the UK student population. *Stud High Educ* 38(10):1457–1471. <https://doi.org/10.1080/03075079.2011.627423>
42. Vicente-Molina MA, Fernández-Sáinz A, Izagirre-Olaizola J (2013) Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. *J Clean Prod* 61:130–138. <https://doi.org/10.1016/j.jclepro.2013.05.015>
43. Adjei R, Addaney M, Danquah L (2021) The ecological footprint and environmental sustainability of students of a public university in Ghana: Developing ecologically sustainable practices. *Int J Sust High Ed* 22:1552–1572. <https://doi.org/10.1108/IJSHE-08-2020-0318>
44. Telleria-Aramburu N, Bermúdez-Marín N, Rocandio AM, Telletxea S, Basabe N, Rebato E, Arroyo-Izaga M (2022) Nutritional quality and carbon footprint of university students' diets: results from the EHU12/24 study. *Pub Health Nutr* 25(1):183–195. <https://doi.org/10.1017/S1368980021002640>
45. Robinson ZP (2015) Are geography students good “environmental citizens?” A comparison between year of study and over time. *J Geog High Ed* 39(2):245–259. <https://doi.org/10.1080/03098265.2014.936312>
46. Pena-Cerezo MA, Artaraz-Minon M, Tejedor-Nunez J (2019) Analysis of the consciousness of university undergraduates for sustainable consumption. *Sustainability* 11(17):4597. <https://doi.org/10.3390/su11174597>
47. Dubois G, Sovacool B, Aall C, Nilsson M et al (2019) It starts at home? Climate policies targeting household consumption and behavioral decisions are key to low-carbon futures. *Energ Res Soc Sci* 52:144–158. <https://doi.org/10.1016/j.erss.2019.02.001>
48. Baiocchi G, Minx J, Hubacek K (2010) The impact of social factors and consumer behavior on carbon dioxide emissions in the United Kingdom: a regression based on input– output and geodemographic consumer segmentation data. *J Ind Ecol* 14(1):50–72. <https://doi.org/10.1111/j.1530-9290.2009.00216.x>
49. Druckman A, Jackson T (2016) Understanding households as drivers of carbon emissions: In Clift R, Druckman A (eds) *Taking Stock of Industrial Ecology*. Springer Open, pp181–203
50. Ribeiro JMP, Hoeckesfeld L, Dal Magro CB, Favretto J et al (2021) Green Campus Initiatives as sustainable development dissemination at higher education institutions: Students' perceptions. *J Clean Prod* 312:127671. <https://doi.org/10.1016/j.jclepro.2021.127671>

51. Hoolohan C, McLachlan C, Jones C, Larkin A, Birch C, Mander S, Broderick J (2021) Responding to the climate emergency: how are UK universities establishing sustainable workplace routines for flying and food? *Climate Policy* 21(7):853–867
52. Cotton D, Bailey J, Tosdevin M (2020) Higher education and the climate emergency: exploring the hidden curriculum of the campus. In: Hinchliffe T (ed) *The Hidden Curriculum of Higher Education*, 29–40. Advance HE: https://www.gcu.ac.uk/_data/assets/pdf_file/0021/30873/advhe_hidden20curriculum.pdf#page=30. Accessed 10 November 202
53. University of Liverpool (no date) Sustainable Liverpool blog. <https://www.liverpool.ac.uk/sustainability/blog/issue-1/>. Accessed 27 October 2023
54. Bakos N, Schiano-Phan R (2021) Bioclimatic and regenerative design guidelines for a circular university campus in India. *Sustainability Basel* 13(15):8238. <https://doi.org/10.3390/su13158238>
55. Hopff B, Nijhuis S, Verhoef LA (2019) New dimensions for circularity on campus—Framework for the application of circular principles in campus development. *Sustainability Basel* 11(3):627. <https://doi.org/10.3390/su11030627>
56. Ellen Macarthur Foundation (no date). Profiled Universities. <https://ellenmacarthurfoundation.org/resources/education-and-learning/profiling-universities>. Accessed 18 August 2023
57. Williams I, Powell L (2019) Sustainable resource management by students at higher education institutions. *Detritus* 6:11–24. <https://doi.org/10.31025/2611-4135/2019.13813>
58. RepairMonitor (2023) Results of worldwide repair data. <https://dashboard.repairmonitor.org/?language=en>. Accessed on 15 October 2023
59. Privett S (2019) Summary findings of research into UK Repair Cafés impact on reducing greenhouse gas (GHG) emissions, Centre for Sustainable Design. https://cfsd.org.uk/wp-content/uploads/2019/01/Summary-findings-of-study-into-UK-Repair-Cafe%20C4%97s-impact-on-GHG-emissions_v1.5.pdf. Accessed 15 October 2023
60. Moalem RM, Mosgaard MA (2021) A critical review of the role of repair cafés in a sustainable circular transition. *Sustainability Basel* 13(22):12351. <https://doi.org/10.3390/su132212351>
61. Repair Café (2023) EU finally proposed right to repair. <https://www.repaircafe.org/en/eu-finally-proposes-right-to-repair/>. Accessed 27 October 2023
62. Pesch U, Spekkink W, Quist J (2019) Local sustainability initiatives: innovation and civic engagement in societal experiments. *Eur Plan Stud* 27(2):300–317. <https://doi.org/10.1080/09654313.2018.1464549>
63. Kannengießer S (2017) Repair cafés: Reflecting on materiality and consumption in environmental communication. In: Milstein T, Pileggi M, Morgan E (eds) *Environmental Communication Pedagogy and Practice*, Routledge, pp 183–194
64. Dietz J, Hoppe M, Kollmann S, Mansfeld U (2019) August. Bike Model District “Alte Neustadt” in Bremen. *IOP Conf Ser: Earth Environ Sci* 323:012086. <https://doi.org/10.1088/1755-1315/323/1/012086>
65. Hector P (2018) Making and repairing places for making and repairing. *Strat Des Res J* 11(2):115–124. <https://doi.org/10.4013/sdrj.2018.112.07>
66. Lynch N (2023) Borrowing spaces: the geographies of ‘libraries of things’ in the Canadian sharing economy. *Tijdschr Econ Soc Geogr* 114(2):157–173
67. Lynch N (2023) Borrowing spaces: the geographies of ‘libraries of things’ in the Canadian sharing economy. *TIJDSCHR ECON SOC GE* 114(2):157–173. <https://doi.org/10.1111/tesg.12548>
68. Baden D, Peattie K, Oke A (2020) Access over ownership: case studies of libraries of things. *Sustainability Basel* 12:7180. <https://doi.org/10.3390/su12177180>
69. Ranzini G, Newlands G, Anselmi G, Andreotti Alberta et al (2017) Millennials and the Sharing Economy: European Perspectives. Available at SSRN: <https://ssrn.com/abstract=3061704>. <https://doi.org/10.2139/ssrn.3061704>
70. Činjurević M, Kožo A, Berberović D (2019) Sharing is caring, and millennials do care: collaborative consumption through the eyes of internet generation. *SE Eur J Eco Bus* 14(1):49–60. <https://doi.org/10.2478/jeb-2019-0003>
71. Department for Education (2019) Student Income and Expenditure Analysis. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/909414/Student_Income_and_Expenditure_Analysis.pdf. Accessed 15 August 2023
72. Sands S, Ferraro C, Campbell C, Kietzmann J, Andonopoulos VV (2020) Who shares? Profiling consumers in the sharing economy. *Australas Mark J* 28(3):22–33. <https://doi.org/10.1016/j.ausmj.2020.06.005>
73. Higher Education Policy Institute and the Universities Partnerships Programme (2019) Somewhere to live: Why British students study away from home – and why it matters. <https://www.hepi.ac.uk/>

- 2019/11/14/why-do-so-many-uk-students-live-away-from-home-and-why-does-it-matter. Accessed 30 October 2023
74. Trenz M, Frey A, Veit D (2018) Disentangling the facets of sharing: a categorization of what we know and don't know about the sharing economy. *Internet Res* 28(4):888–925. <https://doi.org/10.1108/IntR-11-2017-0441>
 75. Jenkins R, Molesworth M, Scullion R (2014) The messy social lives of objects: Inter-personal borrowing and the ambiguity of possession and ownership. *J Consum Behav* 13(2):131–139. <https://doi.org/10.1002/cb.1469>
 76. Lane R (2023) Inputs, outputs and churn: why some products and materials don't move through. *J Cult Econ-UK* 1–7. <https://doi.org/10.1080/17530350.2023.2229352>
 77. Westerberg C, Martinez LF (2023) Young German consumers' perspectives of rental fashion platforms. *Young Consumers* 24(3):309–330. <https://doi.org/10.1108/YC-06-2022-1543>
 78. Cherry CE, Pidgeon NF (2018) Why is ownership an issue? Exploring factors that determine public acceptance of product-service systems. *Sustainability Basel* 10(7):2289. <https://doi.org/10.3390/su10072289>
 79. LE Europe, VVA Europe, Ipsos, ConPolicy and Trinomics (2018) Behavioural Study on Consumers' Engagement in the Circular Economy. European Commission. <https://circulareconomy.europa.eu/platform/en/knowledge/behavioural-study-consumers-engagement-circular-economy>. Accessed 5 September 2023
 80. Kirchherr J, Piscicelli L, Bour R, Kostense-Smit E, Muller J, Huibrechtse-Truijens A, Hekkert M (2018) Barriers to the circular economy: evidence from the European Union (EU). *Ecol Econ* 150:264–272. <https://doi.org/10.1016/j.ecolecon.2018.04.028>
 81. Merino-Saum A, Jemio PR, Hansmann R, Binder CR (2023) Drivers and barriers to participation in the sharing economy: does the environment really matter? A systematic review of 175 scientific articles. *Resour Cons Recycl* 198:107121. <https://doi.org/10.1016/j.resconrec.2023.107121>
 82. Kemp RL (2013) *Town and gown relations: a handbook of best practices*. McFarland and Company Inc., London
 83. Petro G (2021) Gen Z is emerging as the sustainability generation. *Forbes Magazine* (online) 30th April: <https://www.forbes.com/sites/gregpetro/2021/04/30/gen-z-is-emerging-as-the-sustainability-generation/?sh=30dceb586995>. Accessed 10 November 2023
 84. Bakos N, Schiano-Phan R (2021) Bioclimatic and regenerative design guidelines for a circular university campus in India. *Sustainability Basel* 13(15):8238. <https://doi.org/10.3390/su13158238>
 85. Hobson K (2016) Closing the loop or squaring the circle? Locating generative spaces for the circular economy. *Prog Hum Geog* 40(1):88–104. <https://doi.org/10.1177/030913251456663>
 86. Büttner T, Grübler A (1995) The birth of a “Green” generation?: Generational dynamics of resource consumption patterns. *Technol Forecast Soc* 50(2):113–134. [https://doi.org/10.1016/0040-1625\(95\)00052-C](https://doi.org/10.1016/0040-1625(95)00052-C)
 87. Heiss J, Marras I (2009) Educating and engaging youth in sustainable consumption: YouthXchange programme. In: Corcoran PB, Osano PM (eds) *Young people, education, and sustainable development: exploring principles, perspectives, and praxis*. Wageningen Academic Publishers, pp 181–189. <https://doi.org/10.3920/978-90-8686-691-5>
 88. House of Commons Library (2022) How is the rising cost of living affecting students? <https://commonslibrary.parliament.uk/how-is-the-rising-cost-of-living-affecting-students>. Accessed 9th November 2023
 89. Cooper T (ed) (2010) *Longer lasting products: Alternatives to the throwaway society*. Gower Publishing, Ltd.
 90. Collins R (2020) Excessive... but not wasteful? Youth cultures of everyday waste (avoidance). *Cult Geogr* 27(2):293–305. <https://doi.org/10.1177/147447401987163>
 91. Robinson Z, Pedersen RL, Briggs S (2022) Activist learning for sustainability: a pedagogy for change. In: Kelum AA, Gamage NG (eds) *The Wiley handbook of sustainability in higher education learning and teaching*. Wiley, NJ, pp 11–39
 92. Meißner M (2021) Repair is care?-Dimensions of care within collaborative practices in repair cafés. *J Clean Prod* 299:126913. <https://doi.org/10.1016/j.jclepro.2021.126913>
 93. Hansen AR (2018) ‘Sticky’ energy practices: the impact of childhood and early adulthood experience on later energy consumption practices. *Energy Res Soc* 46:125–139. <https://doi.org/10.1016/j.erss.2018.06.013>
 94. Godin L, Laakso S, Sahakian M (2020) Doing laundry in consumption corridors: wellbeing and everyday life. *Sustainability Basel* 16(1):99–113. <https://doi.org/10.1080/15487733.2020.1785095>

95. Welsh Government (2021) Beyond Recycling: a strategy to make the circular economy in Wales a reality. <https://www.gov.wales/sites/default/files/publications/2021-03/beyond-recycling-strategy-document.pdf>. Accessed October 6 2023