

Intervention to Change Environmental and Information Communication Technology

(ICT) Identities

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Currently, the world is getting increasingly digitized, as seen in schools constantly increasing their technological capabilities. Previous research shows how increasing technology impacts identity development both positively and negatively, depending on how the technology is implemented and the extent of usage. These impacts have come to shape individuals' identities, which are based on the roles people play that impact their actions and behaviors. Two roles that have become increasingly relevant in education are one's place in the technological and natural worlds. The first role, labeled information communication identity (ICT), is how much one includes hardware (i.e. cell phone) and software (i.e. Facebook) into their self-concept (Lee et al. 2015), through acquisition of information and communication.

People also have a role in the natural world, in which the more one incorporates the environment into their sense of self, the greater their environmental identity. Due to the importance of developing strong identities in both these areas, this study aims to explore how to develop both types of identity and the resulting effects on overall identity. Specifically, it was hypothesized that writing about one's relationship with technology would increase technology identity, and writing about one's relationship with nature would increase environmental identity, and both would increase general identity, upon the dimensions of autonomy, relatedness, and competence. Furthermore, an identity trade-off is hypothesized, such that as ICT identity increases, technological identity decreases. To test this, two interventions were created, one to increase environmental identity and one for ICT identity. One way identity has been manipulated in a short time span is through thoughtful writing tasks (Layous, Nelson, & Lyubomirsky, 2012), in which participants spend time each day writing about their roles to strengthen them.

Therefore, the current interventions consisted of four 15-minute writing tasks across five days. To increase how close one felt towards nature, ten questions to guide self-reflection were created. To control for differences in demand on identity, the ICT

intervention had identical questions, with environmental related themes replaced with technologically related themes. These questions included modified quotes from environmentalists like Thoreau such as, “we can preserve a natural (technological) balance indefinitely if only humans can avoid disturbing it”. To analyze the impact the intervention had on different types of identity, participants filled out Connectedness to Nature (CNS) and Nature Relatedness Scales (NRS) for environmental identity (Mayer & Frantz, 2004; Nesbit, Zelenski, & Murphy, 2008), autonomy, relatedness, and competence measures for identity (Deci & Ryan, 2000) and a Technology Relatedness scale for ICT identity (modeled after TRS), before and after the intervention.

Seventy-six participants from Washington and Lee University were recruited for this study, and were randomly split into either the environmental or ICT identity condition. Due to attrition and experimental error, 58 participants (34 female, 24 male) completed the entire study and were used in analyses. A repeated measures analysis of covariance (ANCOVA) with the CNS pretest as the covariate, analyzed post-test CNS scores, showing differences by condition. This difference demonstrated that those who wrote about technology decreased their environmental identity while those who wrote about nature increased their environmental identity. ($N = 58$, $F(57) = 6.74$, $p = .01$, $\eta^2 = .11$). Furthermore, there was a negative correlation in that as technological identity increases, environmental identity decreases ($p < .01$), demonstrating these two identities may be perceived as mutually exclusive. Further evidence suggesting identity trade-offs before and after the intervention were also found. There were no significant changes in any of the other identity measures.

The implications of this are increasingly relevant to education policy, because the presence of technology in the classroom may decrease student’s environmental identities, which have been associated with cognitive, psychological, and health benefits. While writing about nature for only four days at an older age may be too little too late, further research on cultivating an environmental identity through paired writing and exposure to nature, potentially with younger children may be more effective in increasing environmental identity. Additionally, when increasing usage of technology in schools, administrators should be more cognizant of potential negative impacts of technology, and implement them in more interdisciplinary, inclusive ways to positively impact identity.

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Introduction

Leopold's (1949) famous words, "when we see land as a community to which we belong, we may begin to use it with love and respect," sparked scholars across disciplines to research the importance of humans' connection to nature and how it may change as civilization develops (Louv, 2005). As industrialization converts wilderness into urbanized areas, it becomes economically vital to increase technology usage, and easier to spend less time outside. Increasing connection to technology enables people to develop relationships (Carter & Grover, 2015), compete for jobs (Spieza, 2012), and assimilate to the developing world. However, the increasing of urbanization comes at the expense of deforesting, polluting, and spending more time inside, thus diminishing people's connection to nature. Fostering nature connectedness has positive effects on identity (Clayton & Opatow, 2004), happiness (Capaldi, Dopko, & Zelenski, 2014), pro-environmental behaviors (Mancha & Yoder, 2015) and well-being (Keniger, Gaston, Irvine, & Fuller, 2013), yet because these impacts are not easily quantifiable, many people have yet to recognize their importance in lieu of the practical and economic benefits of technology connections. To demonstrate how today's society promotes a trade-off between connecting to nature and connecting with technology, the current study aims to show the relationship between the two.

Environmental Identity

The benefits of connecting to nature are rooted in identity theory. According to Stryker and Burke's (2000) identity theory, self-identity is a function of how the roles individuals play lead to their actions and behaviors. For instance, the better sense of self an individual has, the more their behaviors and actions align with their beliefs. Clayton and Opatow (2004) explain how the sense of self encompasses environmental identity, which develops through defining oneself in the context of nature. Nature is used to mean "an organic environment where the majority of ecosystem processes are present (e.g. birth, death, reproduction, relationship between species)," which includes anything that has an interaction of species, including humans (Maller, Townsend, Pryor, Brown, & Leger, 2005). Therefore, environmental identity is an ever changing, complex relationship with cultural, geographical, social, and psychological underpinnings of this natural world that are constantly shifting and rearranging.

Environmental identity is relatively stable, but can be subject to change based on increased knowledge and exposure to nature. Researchers have understood environmental identity as encompassing one's connectedness and relatedness to nature. Increased nature connectedness occurs with a greater inclusion of nature into one's self of self (Schultz, Shriver, Tabanico, & Khazian, 2004). For instance, people who are connected to nature include the natural world in their identity, rather than thinking of human activities and nature as dichotomous entities. Nature relatedness (Zelenski & Nisbet, 2014) includes the emotional components of nature connectedness, while also embracing individual differences in cognitive and experiential connections with the natural environment, which tend to be more stable over time. Nature relatedness specifically targets how understanding, appreciating, and increasing outdoor exposure shape one's environmental

identity, while nature connectedness focuses more on just the affective aspect of environmental identity.

To explain why people develop environmental identities, Wilson (1984) proposed the biophilia hypothesis, in which biologically, people have an innate need to connect with different life forms. Research on the impact of developing this connection has demonstrated many benefits with no known consequences (Keniger, et al., 2013). These include more pro-environmental behaviors (Capaldi et al., 2014; Mancha & Yoder, 2015.), increased well-being (Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009), improved health (Bowler, Buyung-Ali, Knight, & Pullin, 2010), and higher cognitive functioning (Bratman, Hamilton, & Daily, 2012). However, unlike more tangible and visible benefits like understanding technology, people like educators and policy makers undervalue the benefits of connecting to nature.

The benefit of increased pro-environmental behaviors was analyzed in a meta-analysis, in which Capaldi et al. (2014) found nature connectedness was a strong predictor of pro-environmental behaviors and well-being. Pro-environmental behaviors are actions people take (e.g. recycling, composting, gardening), which are sustainable in the context of the environment. While many people believe pro-environmental behaviors are important, people often disconnect their attitudes and behaviors regarding sustainability (Van den Noortgaete & De Tavernier, 2014), and this disconnect can be remedied by developing stronger environmental identities. Other research has shown that more pro-environmental behaviors are strongly correlated with higher nature connectedness, as well (Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009, Passmore

& Howell, 2014). Therefore, increasing environmental identity can create more pro-environmental behaviors.

In addition to more sustainable behaviors, physical and mental health also has been shown to increase with environmental identity. To analyze health benefits elicited by the natural environments, Bowler et al. (2010) conducted a meta-analysis, demonstrating that natural environments are more conducive to health than synthetic environments, which in turn, promote well-being. Putting these consequences in the context of environmental identity, the more one is a part of nature, the healthier one can be. Additionally, higher connectedness to nature increases people's sense of meaning and purpose in life (Howell, Passmore, & Buro, 2012; Zelenski & Nisbet, 2014). Therefore, the benefits that are associated with spending more time outside may be elicited by increasing nature connectivity. Health, psychological well-being, and pro-environmental behaviors all increase with environmental identity, leading researchers to believe that maintaining high environmental identities should be prioritized in an increasingly technological world.

Information Technology (ICT) Identity

Another subset of identity is information communication technology (ICT) identity, or how one interacts with technology through communication and information acquisition (Lee, Lee, & Hwang, 2015). For instance, people with stronger ICT identities believe the use of this hardware and software is more important to their sense of self than those with weaker ICT identities. As ICT identity has become more prominent due to the ever-expanding social media and number of applications available, people are

incorporating ICT into their identity in more ways. Whether incorporating ICT into one's sense of self impacts environmental identity has not yet been researched.

However, research has found that the ways people incorporate ICT into their identity are similar to the ways environmental identity develops (Carter & Grover, 2015). Three ways ICT identity develops are through fostering relations through communication, changing emotional energy (i.e. receiving a Facebook like), and increasing dependence on devices and applications. Similarly, environmental identity also fosters relationships, induces positive emotions, and occurs when people understand their dependence upon the natural world. However, unlike environmental identities, the consequences of developing an ICT identity are mixed. Cultivating one's ICT identity has positive (Ellison, Steinfield, & Lampe, 2007) and negative (Cerretani, Bernaras, & Garay, 2016; Fox & Moreland, 2015) influences on cognition, well-being, and potentially environmental identity. Thus, the mixed results of incorporating technology into one's identity may predict its interaction with environmental identity.

Due to economic, social, and practical reasons, developing a connection to technology has been found to be advantageous in most societies. In an economic analysis of the importance of ICT for global output growth, ICT goods have increased labor productivity growth and efficiency (Colecchia & Schreyer, 2000). Additionally, increases in ICT investments have resulted from previous large yields in this arena (Spieza, 2012), meaning the job market is becoming more reliant on the ICT industries that are increasing their contributions globally. To understand the factors leading to technology in education, Mumtaz (2006) found that with proper resources and time, teachers across age groups preferred and found it necessary to integrate ICT technologies to support progress,

collaboration, and promote innovation in their students. Societal pressures and desire for increased opportunities has driven ICT into resource-rich schools to promote ICT identities.

While this increase in ICT identity has positive impacts in the economic sector and is increasing in salience in education, socially there have been mixed results in how ICT affects communication, cognitive capabilities, and mental disorders. In social media, specifically Facebook, Ellison et al. (2007) found a positive relationship between social media usage and social capital, social support, and other measures of psychological well being. However, others have found that Facebook and other social media sites increase exclusion, distress, and psychological stressors (Chiou, Lee, & Liao, 2015, Fox & Moreland, 2014), meaning communications and remote relationships increase at the expense of other valuable forms of communication, such as face to face conversation and relatedness to the outdoors (Louv, 2005). Therefore, while people continue to use virtual communication, there must be a balance struck between increasing and decreasing psychological health.

In terms of cognitive benefits, educators have adapted technologies to inspire thinking in new ways and using tools that enhance the classroom experience (Mumtaz, 2006). Additionally, computer programs (i.e. Brain Age) have been shown to increase cognitive capabilities (Charness & Boot, 2009), yet the ever present distraction from ICT can diminish efficiency by increasing distractibility (Rosen, Carrier, & Cheever, 2013). Unlike environmental identity, which either promotes or does not change cognitive efficiency (Keniger, et al., 2013), ICT identity incorporates positive and negative effects. The more ICT is used for academics and recreation, the greater the negative effects

(Cerretani, et al., 2016). Therefore, there should exist an optimal level of ICT identity to be cultivated to provide the maximization of these benefits.

ICT and Environmental Identity Trade-Off

As technology capabilities increase, people move towards trading off time spent outside to time spent staring at screens. This trade off may also be reflected in the ratio of ICT to environment incorporated into peoples' identities. While no research has demonstrated this interaction between nature and ICT in identity theory, the literature presents ways these identities develop and what the resulting implications may be.

First, existential psychologists have analyzed the mechanisms behind well being elicited by connections to the environmental and technological realm. For instance, Howell and Passmore, (2014), understood environmental identity as dependent upon the summation of one's behaviors and actions in one's environment that leads to their meaning in life. To this extent, developing an environmental identity depends on relating well to nature. According to their analysis, people more connected to nature are better at handling the six existential anxieties: identity, happiness, meaning in life, isolation, freedom, and death. Therefore, people who have stronger environmental identities are better adjusted at dealing with these existential anxieties, resulting in higher well-being, sense of purpose, and security in their identity. In terms of ICT identity, Internet can be beneficial in terms of increasing identity (Carter & Grover, 2015), but can also be harmful, increasing isolation and decreasing freedom (Bahrainian & Khazae, 2014). Thus, due to the ease of salience of increasing connections on technology, the negative impacts of relatedness may be more prominent as identities incorporate more ICT than environmental connections. This could mean having a more balanced proportion of ICT

and environmental identity could optimize well-being, rather than putting an overemphasis on ICT as society does.

Additionally, self-determination theory aims to explain how creating relationships with the natural world are advantageous and how to balance these benefits with the harms of being overly connected to the technological world. According to Deci & Ryan's (2000) self-determination theory, intrinsically motivated activities are more satisfying than extrinsically motivated ones, and can be analyzed through three basic psychological needs. Thus, having identity that aligns with one's actions leads to heightened levels of self-determination across all three of its dimensions: autonomy, competence, and relatedness. The more one meets these needs, the more self-determined one is and the stronger their sense of identity. Autonomy is feeling in control of one's actions, and can be further elicited by understanding the balance of control between the individual and their environmental or technological usage. Competence, feeling effective and skilled, also benefits from understanding how these skills impact the environment and can develop through ICT usage. Lastly, relatedness, is feeling connected and close with others, including nature and those that exist virtually.

Some research has been done connecting self-determination with identity theory and ICT identity, but not environmental identity. One successful intervention in positive psychology (Layous, Nelson, & Lyubomirsky, 2012) that strengthened autonomy, relatedness, and competence consisted of a fifteen-minute writing task, in which participants were divided into two groups. The experimental group was told to be as creative and imaginative as possible as they introspectively thought about their best possible selves. The control group spent the same amount of time writing about their

daily tasks and activities. After four weeks, writing fifteen minutes on their topic once a week, participants who wrote about their best possible selves reported having higher levels of self-determination across all three dimensions than participants in the control group. The relatedness and autonomy measures have also been linked to higher performance expectancy and perceived enjoyment when using an ICT program (Lee et al., 2015).

While the ICT intervention only looked at how self-determination predicts the impacts of increased exposure to technology, the present study aims to show that increased technology identity can heighten autonomy, relatedness, and competence through writing about how technology increases one's happiness and performance. Due to the success of manipulating identity through writing to increase self-determination, an adapted model of this writing intervention may be able to increase environmental and ICT identity. By rooting both environmental and ICT identity in identity theory, the impacts of understanding how these identities are related initially, and how that relationship can change after an intervention, can have greater applications in education policy and further identity development.

Current Study

Since there are many benefits of creating an environmental identity, an intervention was created to see if this identity could be increased through thoughtful writing tasks. Due to the parallels in the research on ICT identity, an identical intervention was created, interchanging nature related words with technological ones, to see if ICT identity could be altered the same way. Identity was manipulated through a four-day intervention, in which participants wrote about their role in either the natural or

technological world, using prompts taken mostly from environmentalists and identity theorists. Participants took pretests measuring baseline nature connectedness, nature relatedness, and technology relatedness. Each participant was again tested on these measures after the intervention to analyze changes. Additionally, because the literature demonstrates how environmental identity seems to be replaced by ICT identity, this trade-off was analyzed before and after the intervention. The purpose of the study was to use these two interventions to cultivate ICT and environmental identities individually, and then see what impact increasing one identity has on the other. To do so, we tested the following hypotheses:

1. Pre-test nature relatedness will be negatively correlated with pre-test technology relatedness.
2. Nature connectedness will increase after the environmental identity intervention.
3. Technology relatedness will decrease after the environmental identity intervention.
4. Technology relatedness will increase after the ICT intervention.
5. Nature connectedness will decrease after the ICT intervention.
6. Relatedness, competence, and autonomy will increase after both the environmental and ICT interventions.

Method

Participants

Seventy-six participants (24 men, 34 women, 18 unidentified due to attrition) were recruited via a public sign-up sheet in the Psychology Department Building and

notices on campus email, incentivized with two chances to win \$25. Participants were also recruited via introductory environmental studies and psychology classes, whose professors offered extra credit for participation, although no environmental studies majors were recruited. Participants were all undergraduate students at a small liberal arts college ($M_{age} = 19.95$ years, $SD_{age} = 2.14$ years, age range: 18-22 years). The participants were split evenly into two groups, via stratified random sampling, to either be in the nature or technology intervention. Because some participants were directly recruited from introductory environmental studies classes and Outing Club, these students were systematically placed between the two groups to ensure that baseline nature connectedness was relatively equal between conditions.

Materials and Measures

Environmental Identity. To measure environmental identity, two questionnaires were used. First, the Nature Connected Scale (Mayer & Frantz, 2004) that was adapted to measure the construct at the state level (Mayer et al., 2009) was administered. State level constructs are more subject to change over a short period of time, so the Nature Connectedness Scale was used to assess the effectiveness of the intervention. It was a questionnaire consisting of 13-items, in which the participants rated their connection with nature at the current moment (e.g. “Right now I’m feeling a sense of oneness with the natural world around me”) on a 7-point Likert scale (1 = *strongly disagree*, 7 = *strongly agree*). The original scale had a high internal consistency, meaning the items were highly correlated with one another and measured the same thing ($\alpha = .84$), test-retest reliability, meaning that the same survey administered at different times to different groups

produced highly correlated results ($r = .79$), and was correlated with other measures of nature connectedness.

Secondly, the Nature Relatedness Scale (Nisbet, Zelenski, & Murphy, 2008) was used to measure the affective, cognitive, and experiential measures of environmental identity at the trait level. Trait characteristics are much more stable, and thus the measurement will probably not be flexible to change much after only a short intervention. Therefore, the Nature Relatedness Scale was used to assess differences in baseline levels of environmental identity. The Nature Relatedness Scale has 21-items in which the participants rated how they felt towards nature (e.g. “My relationship with nature is an important part of who I am”) on a 5-point Likert scale (1 = *disagree strongly*, 5 = *strongly agree*).

ICT Identity. Participants also filled out a 16-item technology relatedness questionnaire to measure the extent to which they included technology in their identity. The questionnaire, original to this study, consisted of all questions in the Nature Relatedness Scale, in which there were parallels between the natural and technological world and was adapted to measure technology at the state level (e.g. “Right now I’m feeling a sense of oneness with the technology around me”). Participants used a 5-point Likert scale (1 = *disagree strongly*, 5 = *strongly agree*) to respond.

Self-Determination. To measure identity, the Basic Psychological Needs Scale (Deci & Ryan, 2000) measured autonomy, competence, and relatedness, three dimensions of self-determination. The questionnaire consisted of 21-items (e.g. “I feel like I am free to decide for myself how to live my life”) and participants rated to what extent they agreed on a 7-point Likert scale (1 = *not at all true*, 7 = *very true*). Each of the three

dimensions (autonomy, competence, relatedness) has high internal consistency ($\alpha = .80, .82, .83$, respectively). Previous research (Nisbet, 2011) has linked higher nature connectedness with increased scores in all three of these dimensions. For the current study, scores on all three were looked at separately to analyze the impacts of the interventions on identity.

Environmental Identity Intervention. Participants in the experimental group were given 15-minute writing tasks every day for four consecutive days designed to increase environmental identity, administered through Qualtrics, an online platform. Participants first answered seven questions each day about outdoor conditions, how long they spent outside, how long they have spent on technology, and what they were doing at these times. Following these seven questions, each day had a theme (natural world, wilderness, wildness, and nature) that was briefly explained in three sentences.

They were then asked seven questions relating to this theme to guide their self-reflection. In these seven questions they were given the following: 1) a list of items to relate to the theme, (e.g. a flower in a pot is associated with natural), 2) general questions targeting how these themes can be incorporated into their identity, and 3) two quotes they were asked to rate on a 5-point Likert scale to what extent they believe the questions to be true (1 = *Not True*, 5 = *True*) and why. Many quotes were taken either directly from writings by Cronon (1995), Leopold (1949), Thoreau (1849), or were modified versions of things they have written (e.g. “We can preserve a natural balance more or less indefinitely if only humans can avoid disturbing it”). The final question each day was the same integrative question, in which participants wrote about their role in the natural

world. After 15 minutes, Qualtrics automatically exited out of the writing task to ensure all participants wrote for an equal amount of time.

ICT Identity Intervention. Participants in the ICT intervention group were also given 15-minute writing tasks every day for four consecutive days intended to elicit a stronger ICT identity. The first seven questions were identical and the writing tasks were modified version of the environmental identity writing tasks, in which nature related themes were replaced with technology related themes (technological world, social media, cell phones, and Internet). The same format was used, with technology words replacing the nature words whenever possible. The final question each day was the same integrative question, in which they wrote about their role in the technological world.

Positive and Negative Affect Scale To control for demand characteristics, Watson, Clark, and Tellegen's (1988) Positive and Negative Affect Scale (PANAS) was administered before participants started the writing task for the day. Participants were constantly aware that mood was being measured, and rated to what extent they felt the 20 items listed on a 1-5 Likert scale (1 = *very slightly or not at all*, 5 = *extremely*). Due to this survey, many participants thought the purpose of the study was to measure how mood impacts the writing tasks. By disguising the true purpose of the study, the participants were less likely to change their responses based on what they thought the experiment expected.

Demographic questionnaire. Participants also completed a demographics questionnaire, reporting their age, gender, class year, major(s), minor(s), activities they were involved with, and hometown.

Procedure

Participants came into an assigned room in a university building in groups of no more than three. The experimenter instructed participants of the time commitment before they consented to participation. Participants then opened the Qualtrics survey, starting with the informed consent. The participants were equally split into either the environmental or ICT intervention. Afterwards, all participants were given the Nature Connectedness, Nature Relatedness, Basic Psychological Needs Scale, and Technological Relatedness questionnaires to assess baseline levels of environmental identity, self-determination, and technological identity. Upon completion, participants were instructed to spend 15 minutes every night answering questions for the next three days on either technology or nature. They were instructed that on the fourth day, after their writing task, they needed to complete a post-test. Participants had up to five days to complete each task and were instructed to wait at least 12 hours between tasks. This was intended to control for demand characteristics as well as assess the longevity of the study's impacts. Participants then answered the demographic questionnaire and were debriefed, all online on their own time. The debriefing also included references for all the quotes presented in the study.

Results

Reliability Analysis and Attrition

Seventy-six participants were recruited from this study and completed the Nature Connectedness Scale, Nature Relatedness Scale, and Technology Relatedness Scale, as well as the first 15-minute writing task. Throughout the course of the seven days, 18 participants' data for the post-test or specific interventions were not recorded and thus these participants could not be used in the final analyses. The pre-test scores for

these participants were not significantly different than for the rest of the participant population ($p > .10$) on each measure. Additionally, a chi-squared analysis was conducted to assess if the number of people who dropped out in the technology intervention was different than that of the environmental intervention, and found that the number of people who drop out do not vary by condition ($\chi^2 = .29, p > .10$).

The pre-test mean nature connectedness scores had strong construct validity ($\alpha = .82$) as did the nature relatedness scores ($\alpha = .80$). Additionally, both measures were highly correlated with each other ($r = .78$), which is consistent with previous studies that show the relationship between the nature connectedness and nature relatedness scales. Additionally, the technology relatedness scale also had a high-internal consistency ($\alpha = .88$) demonstrating this measure may capture the ICT identity construct.

Pre-Test Identity Trade-Offs

The primary hypothesis was first tested using a correlational analysis on pre-test scores ($N = 76$), finding higher levels of nature relatedness were correlated with lower levels of technology relatedness ($r = -.36, p < .01$), suggesting a moderate negative relationship between these two types of identity. Additionally, using the demographic information, participants were separated into those involved in outdoor activities ($n = 17$, Student Environmental Action League and Outing Club) and those who did not pursue outdoor activities ($n = 39$). Looking at pre-test scores of only those who self-reported what activities they do ($n = 56$), a 3 (identity measure) X 2 (activity type) repeated measures ANOVA was conducted to assess differences in technology relatedness, nature relatedness, and nature connectedness by activity type, finding a significant interaction effect ($F(2, 148) = 11.07, p < .001, \eta^2 = .18$; see Figure 1). To analyze the source of this

interaction, three two-sample t-tests found participants who were involved in outdoor activities had greater nature connectedness ($t(52) = 2.59$, $p = .01$, $d = .98$), greater nature relatedness ($t(52) = 3.23$, $p < .01$, $d = .73$), and lower technology relatedness ($t(52) = 2.74$, $p < .01$, $d = .80$) than participants who were not involved in outdoor activities.

Differences from Intervention

To analyze the differences between groups from the pre-test to the post-test, a 2 (intervention type) \times 2 (time) mixed-design ANOVA was conducted on nature connectedness. An interaction effect showed that the changes in nature connectedness from pre-test to post-test were different based on the participants' intervention type ($N = 58$, $F(1, 56) = 5.75$, $p = .02$, $\eta^2 = .10$, see Figure 2). In subsequent t-tests analyzing the source of the interaction, it was found that amongst people exposed to the technology intervention, nature connectedness decreased from the pre-test ($M = 4.04$, $SD = .94$) to the post-test ($M = 3.65$, $SD = 1.03$, $t(27) = 2.25$, $p = .03$, $d = .42$). However, the difference in nature relatedness scores from before to after the environmental identity intervention was not significantly different ($p > .05$, $d = .21$).

Additionally, a 2 (activities) \times 2 (time) mixed design ANOVA was conducted amongst just those who underwent the technology intervention on their technology relatedness. A main effect of time supported technology relatedness increased in both groups from pre-test to post-test, ($F(1, 23) = 7.43$, $p = .01$, $\eta^2 = .10$, see Figure 3). Additionally, a significant interaction effect showed technology relatedness decreased more amongst participants involved in outdoor activities than those not involved in outdoor activities ($F(1, 23) = 4.24$, $p = .05$, $\eta^2 = .078$). A t-test found this interaction was driven by those participating in outdoor activities having a significant increase from pre-

test to post-test technology relatedness ($t(10) = 2.12, p = .04, d = .99$). No other demographic factors made a difference in technology or nature relatedness.

Furthermore, ANOCAVAs were conducted with pretests as the covariate for autonomy, relatedness, and competence, finding no significant differences between conditions' post-test scores (p 's $> .05$), using the pretest score for each measure as a covariate. In a chi-squared test to analyze if the self-reported weather and temperature impacted the post-test results, no significant differences were found between the groups within the temperature categories ($p > .05$) or the weather categories ($p > .05$). Furthermore, the total time outside and time spent on technology were not significantly impacted by the intervention ($ps > .05$).

Discussion

Main Findings

To interpret the results of the intervention, first the validity of the nature connectedness, nature relatedness, and technology relatedness measures were analyzed. The new measure of technology relatedness had a high internal consistency, was able to be manipulated at the state level, and thus was used to measure changes in ICT identity. The other two measures had similar consistency and reliability ratings as those from previous studies. Additionally, the drop out rate was neither impacted by condition type nor was pre-test scores on any of the measures different amongst the people who dropped out from the people who were used in final analyses. Thus, the hypotheses could be tested.

The first hypothesis was supported because amongst the pre-test scores, technological relatedness negatively correlated with nature relatedness. Additionally, it

was found that the participants involved in outdoor activities had higher mean nature relatedness and nature connectedness, as well as lower technological relatedness than participants not involved in outdoor activities. This suggests the hypothesized trade-off existed before any intervention, such that people tend to develop one identity over another.

The second and third hypotheses were only partially supported. After participants underwent their respective interventions, there were significant differences in nature connectedness based on condition. Mean nature connectedness decreased amongst participants who underwent the ICT intervention, but did not significantly increase for participants who underwent the environmental identity intervention. However, because the increase in nature connectedness after the environmental identity intervention had a moderate effect size, increasing the power by adding more participants or using a longer intervention could help these results be more meaningful.

The successfulness of the ICT intervention was moderated by activity type because those involved in Outdoor Activities started with higher baseline nature relatedness and lower baseline technology relatedness. Participants in outdoor activities significantly increased their technology relatedness compared to those not involved in outdoor activities. Future studies that have more power could analyze how involvement in outdoor activities could potentially mediate the effects of an environmental identity intervention on increasing nature connectedness as well. However, because environmental identity did not change enough, individual differences could not be detected without more power.

To support the results, the answers to the questions in both interventions were looked at to see if participants' answers to the writing tasks could detect their baseline identity and how it changed. Common themes in the environmental identity condition were a greater understanding of a need for balance, a stronger notion of how humans are part of the ecosystem, and acknowledging how technology separates people from being completely a part of the natural world. While these themes occurred in some of the participants' answers, other participants did not believe their identities changed because they already understood their role in the natural world, or the writing tasks could not get them to alter how they felt about their role. Therefore, the intervention may be more successful if the population only included people who had not already underwent similar lessons to understand their role in nature. Another potential third variable may also be fixed versus growth mindset, insofar as participants who are more open minded to identity changes may benefit more from this type of intervention.

In the ICT identity condition, many people realized they were more connected to technology than they thought and that even when they were immersed in nature they also used technology. These reflections supplement the results, insofar as people tend to view these identities as mutually exclusive and as one identity develops, the other diminishes. Interventions to increase both types of identity positively are critical in today's society, which emphasizes a need for ICT identity, but benefits cognitively, psychologically, and healthfully from stronger environmental identities.

Limitations and Implications

Furthermore, these results imply that creating a successful writing intervention to increase IT identity is much easier than to increase environmental identity, potentially

because people are more aware of how connected they are to nature, while people do not realize how dependent they are on technology. Moreover, environmental identities in the literature tend to be longer and more time intensive in order to make any significant identity changes. Additionally, as educators continue pushing for increased ICT in the classroom, from grade school throughout college, this may have deleterious effects on environmental identity. Because environmental identity's benefits are intangible and not well known to the general public, this is the first study to look at how developing higher technological identities have negative impacts on environmental identities.

However, a potential reason ICT identity was more malleable than environmental identity was due to the online intervention administration. While similar identity interventions did not see a difference in results from those who used paper versus computers (Layous et al., 2012), specifically targeting ICT identity may lead to a stronger difference. People across both conditions were exposed to ICT for two hours throughout the week of the study while writing their answers online, while there was no additional outdoor exposure. Implementing the same intervention outside on paper may have different impacts on identity due to exposure. However, because technology does make interventions easier and psychology studies are more time efficient, resource efficient, and economical when administered online, it would not be as externally valid to have this study administered all on paper.

Another potential limitation is the duration of the study. Since identity is relatively stable over time, it is challenging to increase in only four days, especially amongst college students. Starting the identity intervention at younger ages and longitudinally analyzing how their identities relate over time can be critical to further

understanding the independence of these two identities and how they can be cultivated together, rather than individually.

A potential factor influencing environmental identity is educational background and the sampling community. The community in which the study was conducted has very few environmental studies majors, and about half of the student body is involved in the Outing Club. Studying a population with different characteristics and preexisting ties to nature could potentially increase the successfulness of the intervention, especially amongst people who have lower, less defined environmental identities. Additionally, because no successful environmental identity interventions have occurred without increasing exposure to outside, research needs to identify if the intervention could impact environmental identity more with changes to the content, duration, or age group the intervention is targeting or if increased outdoor exposure is imperative.

Policy Suggestions

Despite the difficulties in implementation and measuring the changes of environmental and ICT identity, the results of this study have interesting and relevant implications in identity development, environmental policy, and education. First, rather than having schools constantly increase technological capabilities, at the expense of environmental education; more integration of the two identities should be fostered through curricula. Additionally, increasing salience of environmental benefits at the policy level can potentially ameliorate the mutual exclusivity that exists between these two identities. If people actively work towards holding onto their environmental identities in an increasing urbanized world, they can maintain the connections to nature that allow better health, well-being, and sustainable behaviors.

As the first study to identify the trade-off between these two identities, the policy suggestions that come from this research depend on continued research, both in experimental and applied settings. The directions of this research should be towards replicating this trade-off, understanding if its impacts expand to include all the benefits associated with nature and consequences associated with ICT. If, as expected, the results of this study have extensions in cultivating sustainable behaviors, cognitive benefits, health benefits, and increased productivity, then it is imperative that the integration of environmental and ICT identity begin at earlier ages.

First, environmental identity must begin to be cultivated as soon as the child can appreciate nature and continue at home and at school. By increasing awareness of the importance of nature and exposing more children at younger ages to the natural world to develop their environmental identities more, the benefits should be seen throughout their life. In conjunction with this, technology should be able to be included in their connection to nature, and they should learn that developing one identity should not necessarily be at the expense of the other.

Examples of this being done today range from photojournalism projects to geocaching, in which people begin by being outside, and then use cameras and cell phones to take pictures or find GPS coordinates. Through the use of integrated education, the gap between these identities may be able to close, allowing people to do a better job developing these advantageous identities. Through connecting both to nature and technology, the path towards ameliorating environmental issues in today's society can be paved by innovative ideas, some of which that use ICT to their advantage.

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Figures

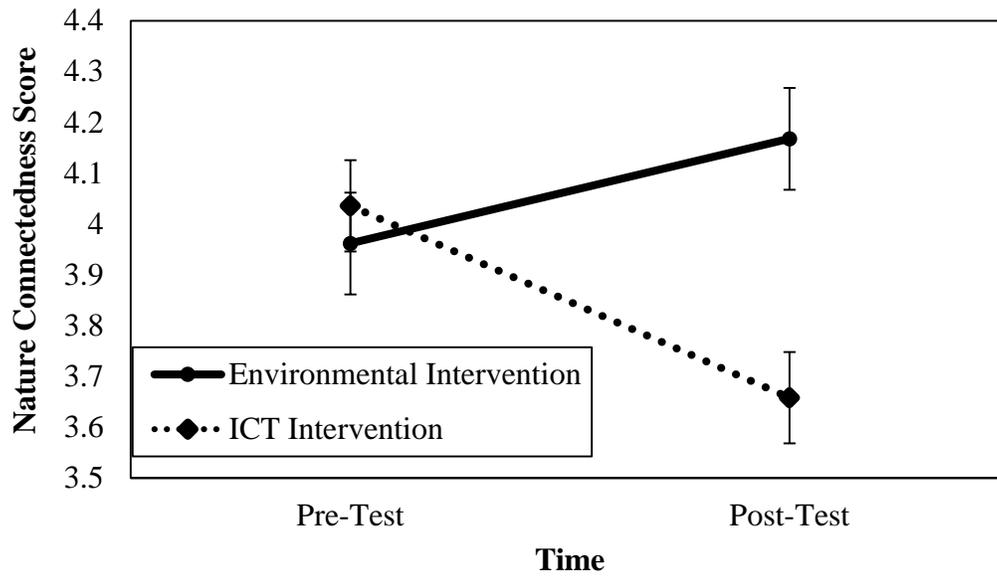


Figure 1. Nature connectedness for each intervention type from pre-test to post-test. The increase in nature connectedness after the environmental intervention was not significant from pre-test to post-test. Error bars represent standard errors.

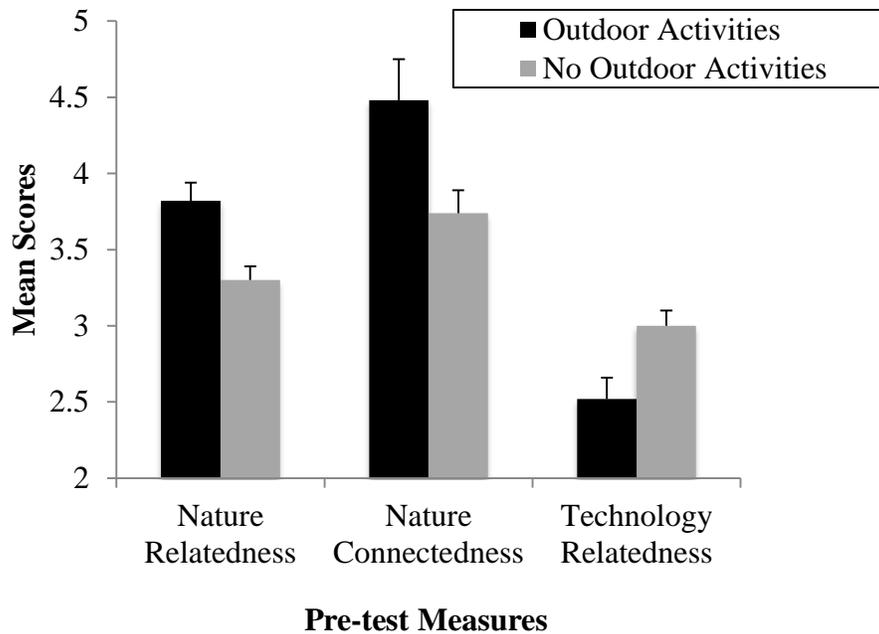


Figure 2. Nature relatedness, connectedness, and technology relatedness for each intervention type based on outdoor activity (Outing Club and Student Environmental Action League) involvement Error bars represent standard errors.

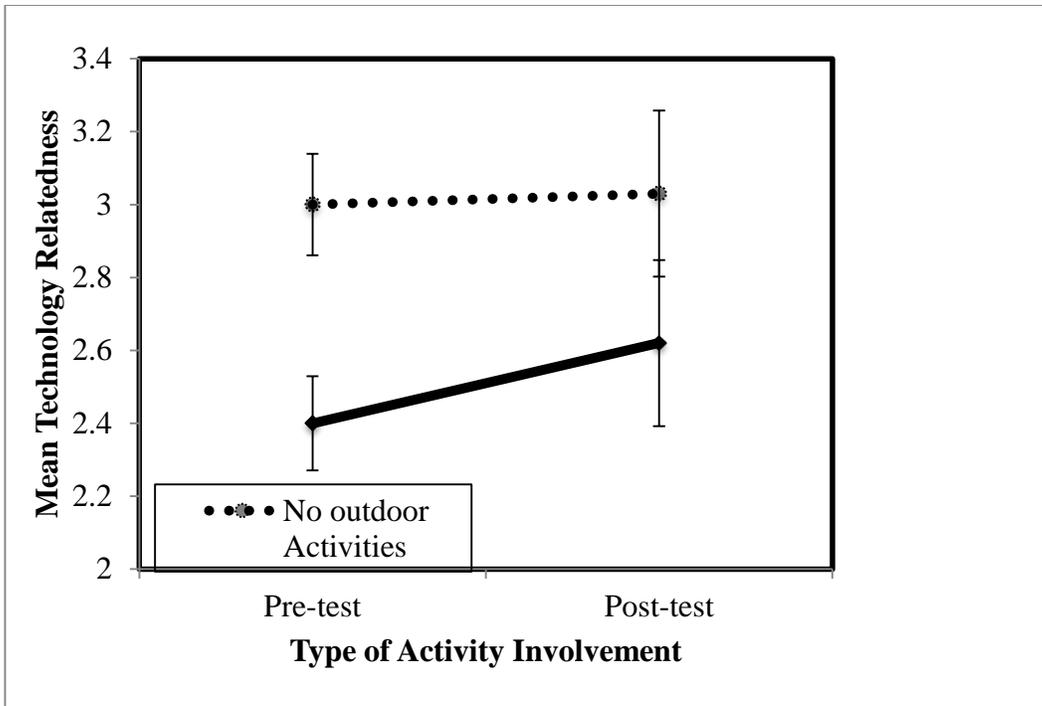


Figure 3. Amongst the technology intervention, technology relatedness from pre-test to post-test based on activity type. Error bars represent standard errors.

Appendix A

Informed Consent Form

CONSENT TO PARTICIPATE IN HUMAN RESEARCH PROJECT

Washington and Lee University

Project Title: Impacts of Writing on Identity Development**Investigators:** *Maya Epelbaum*

Purpose of the Research: You have been asked to participate in a research conducted by Washington and Lee University. The purpose of this study is to investigate your reactions to the given scenario. The Institutional Review Board for Research (IRB) with Human Subjects at Washington and Lee University has approved the protocol for this project.

Procedures: In this experiment you will be writing about how you relate to others, nature, and technology. You will need to supply your email address and over the next four days you will receive an email between 5-6:00 in the evening and you must write according to the prompts for fifteen minutes each of these nights. The first and fourth day there will be additional questions after the writing prompts.

You may only participate in this study if you are 18 or older.

Duration: The experiment will be 30 minutes today, 15 minutes for the next two days, and 30 minutes on the fourth day. All tasks must be completed within five days.

Foreseeable Risks or Discomfort: This experiment involves reading, writing, and answering questions, thus minimal risks or discomforts are expected. Some of the writing may require a great deal of thought.

Benefits: Writing tasks of this nature have been shown to increase well-being and happiness.

Participation in this research is entirely voluntary. You may refuse to participate or may withdraw from participation at any time without penalty. You may also skip any item you prefer not to answer. However, if you do so we will not be able to count your results.

Confidentiality will be maintained. All data kept on a password-protected computer in a locked room. Any information derived from this research project which personally identifies you will not be voluntarily released or disclosed without your separate consent, except as specifically required by law.

Contact Information. If, at any time, you have questions regarding this research or if you wish to discuss your rights as a research participant, you may contact *Bryan Price*, chair of the Institutional Review Board for Research with Human Subjects at *bprice@wlu.edu* or (540) 458-8316.

I consent to participate in this study.

Signature: _____ Date: _____

Appendix B

Debriefing Form

This study investigated whether an environmental or technological identity can be created using writing tasks, and if this can lead to differing levels of nature connectedness. Nature connectedness, or how much a person includes the natural world in their sense of self, has been shown to predict health, well-being, and pro-environmental behaviors (i.e. recycling). Positive psychology studies have shown increases in identity and environmental identity formation through writing interventions. The present study aimed to increase nature connectedness through writing tasks. It was hypothesized that after the intervention, nature connectedness and self-determination (relatedness, autonomy, and competence) would be greater for the nature writing group* than for the technology writing group.

*References used for the nature connectedness writing intervention

Cronon, W. (1995). *Uncommon ground: Rethinking the human place in nature*. New York, New York: W.W. Norton & Company Inc., 20-56, 69-90.

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Appendix C

Nature Relatedness Scale

Instructions: For each of the following, please rate the statement, using the scale from 1 to 5 as shown below rather than how you think “most people” feel.

1- Strongly Disagree 3-Neither agree nor disagree 5-strongly agree

1. I enjoy being outdoors, even in unpleasant weather.
2. Some species are just meant to die out or become extinct.
3. Humans have the right to use natural resources any way we want.
4. My ideal vacation spot would be a remote, wilderness area.
5. I always think about how my actions affect the environment.
6. I enjoy digging in the earth and getting dirt on my hands.
7. My connection to nature and the environment is a part of my spirituality.
8. I am very aware of environmental issues.
9. I take notice of wildlife wherever I am.
10. I don't often go out in nature.
11. Nothing I do will change problems in other places on the planet.
12. I am not separate from nature, but a part of nature.
13. The thought of being deep in the woods, away from civilization, is frightening.
14. My feelings about nature do not affect how I live my life.
15. Animals, birds and plants should have fewer rights than humans.
16. Even in the middle of the city, I notice nature around me.
17. My relationship to nature is an important part of who I am.
18. Conservation is unnecessary because nature is strong enough to recover from any

human impact.

19. The state of non-human species is an indicator of the future for humans.

20. I think a lot about the suffering of animals.

21. I feel very connected to all living things and the earth.

Scoring Information: Reverse scored items: 2, 3, 10, 11, 13, 14, 15, 18; NR-self items: 5, 7, 8, 12, 14, 16, 17, 21; NR-perspective items: 2, 3, 11, 15, 18, 19, 20; NR-experience items: 1, 4, 6, 9, 10, 13 **Overall NR score is calculated by averaging all 21 items** (after reverse scoring appropriate items). Scores on the 3 NR dimensions are also calculated by averaging appropriate items after reverse scoring.

Appendix D

State Nature Connectedness Scale

Please answer each of these questions in terms of the way you feel at the present moment. There are no right or wrong answers. Using the following scale, in the space provided next to each question simply state as honestly and candidly as you can what you are presently experiencing.

1- Strongly Disagree

4-Neither agree nor disagree 7-strongly agree

1. Right now I'm feeling a sense of oneness with the natural world around me.
2. At the moment I'm feeling that the natural world is a community to which I belong.
3. I presently recognize and appreciate the intelligence of other living organisms.
4. At the present moment, I don't feel connected to nature.
5. At the moment, I can imagine myself as part of the larger cyclical process of living.
6. At this moment, I'm feeling a kinship with animals and plants.
7. Right now, I feel as though I belong to the earth just as much as it belongs to me.
8. Right now, I am feeling deeply aware of how my actions affect the natural world.
9. Presently, I feel like I am part of the web of life.
10. Right now, I feel that all inhabitants of earth, human and nonhuman, share a common life force.
11. At the moment, I am feeling embedded within the broader natural world, like a tree in a forest,
12. When I think of humans' place on earth right now, I consider the to be the most valuable species in nature.
13. At this moment, I am feeling like I am only a part of the natural world around me, and that I am no more important than the grass on the ground or the birds in the trees.

Appendix E

Technology Relatedness

1- Strongly Disagree

3-Neither agree nor disagree 5-strongly agree

1. I enjoy using technology.
2. I enjoy using technology, even when it is finicky and difficult to use.
3. Humans have the right to use technology in whatever way we want.
4. My ideal vacation spot would be somewhere with access to all the newest technological innovations.
5. I always think about how my actions are affected by technology.
6. I enjoy figuring out how my technology works.
7. My connection to my phone and computer is part of my spirituality.
8. I am very aware of issues surrounding technology use.
9. I take notice of new technology gadgets all of the time.
10. I don't often use technology.
11. The thought of being too involved with my technology is frightening.
12. My feelings about technology affect how I live my life.
13. Even in the middle of the wilderness, I will think about using my phone.
14. My relationship to my phone, computer, etc. is an important part of who I am.
15. I think a lot about the suffering technology has caused.
16. I feel very connected to all forms of technology and social media.

Appendix G

Nature Writing Intervention

Day 1-4

Please answer the following questions.

1. Please check the weather that best describes today?

Rainy Cloudy Partly Cloudy Sunny Snowy

2. How long were you outside today?

>30 minutes 30-60 min 1-2 hrs 2-4 hrs Over 4 hours

3. What did you do when you were outside? (Short answer)

4. Please check the place that best describes your location? Or write where you are.

My room The library/Academic Building Outside

Other: _____

5. For about how long did you use technology today?

>30 minutes 30-60 min 1-2 hrs 2-4 hrs Over 4 hours

6. What kind of technology were you using and what were you doing? (Short answer)

Day 1: The Natural World

Today you will be writing about your role in the natural world. The word “natural” has many different connotations, from “good/right” to “outside of human influence” up to “the world with which we live” and countless things in between. The following questions are meant to help you understand your definition of the “natural world”.

1. To start, what do you think should be considered the “natural world.” When you answer this, please describe how **you** fit into the natural world.

2. Humans and animals interact with nature positively and negatively. Write about how you have witnessed or heard about humans interacting positively with nature. Please be as descriptive as possible.

3. Please check everything that you can consider to be natural.

1. A tree in a botanical garden
2. A tree in the woods

3. Bears
4. Flowers in a flower pot
5. Yourself
6. Cornfields
7. Humans
8. Box of granola bars
9. Hunting
10. Deer

4. Look at the list of items you did not check. Come up with a definition of the natural world that encompasses these items as well. To help you do this, you can write about each word individually. If you checked all the items, please explain how all of these items are considered natural.

5. “The natural world is far more dynamic, far more changeable, and far more entangled with human history than popular beliefs about the balance of nature have typically acknowledged.”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

6. “We can preserve a natural balance more or less indefinitely if only humans can avoid disturbing it.”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

7. Please use the remaining time to write about your role in the natural world. (ex. How are you part of the natural world? Do you like considering yourself a part of the natural world? How have your ideas about your role in the natural world changed?)

Day 2: Wilderness

Today you will be writing about what wilderness is. The word “wilderness” has many different uses, from “antithesis to civilization” to “preservation of the world” up to “opposite of the orderly and good” and countless things in between. The following questions are meant to help you understand your definition of “wilderness”.

1. To start, what do you think should be considered the “wilderness.” When you answer this, please describe how **you** fit into the wilderness and how the wilderness fits into your concept of the natural world.

2. Think about a time you have felt like you were in the wilderness. How has that shaped your views on your role in the natural world? If you do not think you have experienced the wilderness, please write about a time that is the closest to it.

3. Please check which of the following words you associate with the wilderness?

1. Changeable
2. Pristine
3. Protected
4. Tame
5. Natural
6. Stable
7. Accessible
8. Understandable
9. Disaster
10. Important

4. Look at the list of items and think about the antonyms to these words (e.g. the antonym of changeable is fixed) and how they relate to wilderness, too. Pick five words and explain how wilderness can be associated with both the synonym and antonym of the words.

5. “We mistake ourselves when we suppose that wilderness can be the solution to our culture’s problematic relationship with the nonhuman world”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

6. “Wilderness is the preservation of the world”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

7. Please use the remaining time to write about your role in the natural world. (ex. How are you part of the natural world? Do you like considering yourself a part of the natural world? How have your ideas about your role in the natural world changed?)

Day 3: Wildness

Today you will be writing about what it means to be “wild”. The word “wild” has many different uses, from “an energetic child” to “anything that cannot be tamed” up to “all of

nature” and countless things in between. The following questions are meant to help you understand your definition of “wild”.

1. To start, what do you consider to be “wild.” When you answer this, please describe how **you** can be considered wild and how this idea that people are wild fits into your concept of the natural world.
2. Think about a time when you thought of yourself or another as wild. How can you use this concept of wild to understand how humans are just as wild as other parts of nature?
3. Please check which of the following things you associate with “the wild.”
 1. Deer running across a college campus
 2. Your Backyard
 3. Farms
 4. Bird’s nest
 5. Friday nights
 6. Deer stopping for a car
 7. Hunting
 8. Flowers in a flower pot
 9. Bees around the flowers in a flower pot
 10. Children playing
4. Look at the items you checked. Do you consider these items natural as well? Please explain, including the difference (if any) there is between something being wild and something being natural.
5. “Wildness can be found anywhere”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither neither True nor False 4-Slightly True 5-True
“Pin

Please explain your answer. Please be as specific as possible and give examples.

6. “It is in vain to dream of a wildness distant from ourselves.”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

7. Please use the remaining time to write about your role in the natural world. (ex. How are you part of the natural world? Do you like considering yourself a part of the natural world? How have your ideas about your role in the natural world changed?)

Day 4: Nature

Today you will be writing about what it means to be in “nature”. The word “nature” has many different uses, from “green space” to “the outdoors” to “everything and everywhere” and countless things in between. The following questions are meant to help you understand your conception of “nature”.

1. To start, what do you consider to be “nature.” When you answer this, please describe how **you** can be considered part of nature and how this idea that people are part of nature fits into your concept of the natural world.
2. Think about a time you have been in nature. Why did you pick this place as nature?
3. Think about a time you have been somewhere outside of nature. Why did you pick this place as outside of nature?
4. Can you find similarities between these places? Please explain.
5. Please check which of the following things you associate with “nature”?
 1. Mowed lawns
 2. Outdoors
 3. Walking to the store
 4. National Parks
 5. Plastic flowers in a flower pot
 6. Shelters
 7. Yourself
 8. Heat
 9. Trees in a garden
 10. Driving on a dirt road

4. Look at the list of items you did not check. Come up with a definition of the natural world that encompasses these items as well. To help you do this, you can write about each word individually. If you checked all the items, please explain how all of these items are considered part of nature.

5. “Nature is a stable, holistic, homeostatic community capable of preserving its natural balance more or less indefinitely”

To what extent to you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

6. “I am part of nature”

To what extent to you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

7. Please use the remaining time to write about your role in the natural world. (ex. How are you part of the natural world? Do you like considering yourself a part of the natural world? How have your ideas about your role in the natural world changed after the past three days of writing?)

Appendix H

Technology Writing Intervention

Day 1-4

Please answer the following questions.

1. Please check the weather that best describes today?

Rainy Cloudy Partly Cloudy Sunny Snowy

2. How long were you outside today?

>30 minutes 30-60 min 1-2 hrs 2-4 hrs Over 4 hours

3. What did you do when you were outside? (Short answer)

4. Please check the place that best describes your location? Or write where you are.

My room The library/Academic Building Outside

Other: _____

5. What time is it?

6. For about how long did you use technology today?

>30 minutes 30-60 min 1-2 hrs 2-4 hrs Over 4 hours

7. What kind of technology were you using and what were you doing? (Short answer)

Day 1: Technological World

Today you will be writing about your role in the technological world. The word “technology” has many different connotations, from “civilized” to “efficient and life-enhancing” up to “negatively enveloping the world with which we live” and countless things in between. The following questions are meant to help you understand your definition of the “technological world”.

1. To start, what do you think should be considered the “technological world.” When you answer this, please describe how **you** fit into the technological world.

2. Humans interact with technology positively and negatively. Write about how you have witnessed or heard about humans interacting positively with technology. Please be as descriptive as possible.

3. Please check everything that you can consider to be associated with technology.

- 11. Efficient
- 12. Makes life simpler
- 13. Engaging
- 14. Immersive
- 15. Exciting
- 16. Inclusive
- 17. Interesting
- 18. Entertainment
- 19. Beneficial
- 20. Influential

4. Look at the list of items you did not check. Come up with a definition of the technological world that encompasses these items as well. To help you do this, you can write about each word individually. If you checked all the items, please explain how all of these items are associated with technology.

5. “The technological world is far more dynamic, far more changeable, and far more entangled with human life than popular beliefs typically acknowledge.”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

6. “We can preserve a balance with using technology more or less indefinitely if only humans can use it wisely.”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

7. Please use the remaining time to write about your role in the technological world. (ex. How are you part of the technological world? Do you like considering yourself a part of the technological world? How have your ideas about your role in the technological world changed?)

Day 2: Social Media

Today you will be writing about what social media is. The phrase “social media” has many different uses, from “antithesis to being in the present” to “the allowance of communication” up to “opposite of being social” and countless things in between. The following questions are meant to help you understand your definition of “social media”.

1. To start, what do you think should be considered the “social media.” When you answer this, please describe how **you** fit in with your concept of social media and how it relates to your concept of the technological world.

2. Think about a time you have felt like you were part of social media. How has that shaped your views on your role in the technological world? If you do not think you have ever been part of social media, please write about a time that is the closest to it.

3. Please check which of the following words you associate with the social media?
 1. Twitter
 2. Snapchat
 3. Facebook
 4. Instagram
 5. Emailing
 6. Instant Messaging
 7. Skype
 8. Pinterest
 9. Buzzfeed
 10. LinkedIn

4. Look at the list of items you checked. Do you consider these to be part of your identity? Please explain, including how this relates to your role in the technological world.

5. “We mistake ourselves when we suppose that social media can be the solution to our culture’s problems.”

To what extent to you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

6. “Social media is the preservation of communication”

To what extent to you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

7. Please use the remaining time to write about your role in the technological world. (ex. How are you part of the technological world? Do you like considering yourself a part of the technological world? How have your ideas about your role in the technological world changed?)

Day 3: Cell Phones

Today you will be writing about what it means to have a “cell phone”. The word “cell phone” has many different ideas associated with it, from “a means to communicate” to “isolating and detaching” up to “life consuming” and countless things in between. The following questions are meant to help you understand your concept of “cell phones”.

1. To start, what do you consider to be the importance of “cell phones.” When you answer this, please describe how **you** relate to your cell phone and how people’s connections cell phones fits into your concept of the technological world.
2. Think about a time when you felt attached to your cell phone. How has that shaped your views on your role in the technological world? If you do not think you have had this experience with your cell phone, please write about a time that is closest to it.
3. Please check which of the following things you associate with “cell phones”?
 1. Fostering Connections
 2. Necessary
 3. Boring
 4. Isolating
 5. Source of information
 6. Useless
 7. Uninteresting
 8. Nuisance
 9. Difficult to use
 10. Sadness

4. Look at the list of items and think about the antonyms to these words or phrases (e.g. the antonym of fostering connections is preventing connections) and how they relate to cell phones, too. Pick five words and explain how cell phones can be associated with both the synonym and antonym of the words.

5. “Cell phones can be found anywhere”

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

6. "It is in vain to dream of ourselves distant from cell phones."

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

7. Please use the remaining time to write about your role in the technological world. (ex. How are you part of the technological world? Do you like considering yourself a part of the technological world? How have your ideas about your role in the technological world changed?)

Day 4: Internet

Today you will be writing about the conception of "Internet". The word "Internet" has many different uses, from "source of all knowledge" to "tenuous, incomprehensible thing" to "everything and everywhere" and countless things in between. The following questions are meant to help you understand your conception of the "Internet".

1. To start, what do you consider to be the "Internet." When you answer this, please describe how **you** can be considered part of the Internet and how this idea that people are part of the Internet fits into your concept of the technological world.
2. Think about a time you have been most attached to the Internet. Why did you pick this time?
3. Think about a time you have been the most disconnected to the Internet. Why did you pick this time?
4. Can you find similarities between these times? Please explain.
5. Please check which of the following things you associate with the "Internet"?
 1. Bewilderment
 2. Terror
 3. Excitement
 4. Anger
 5. Fear
 6. Disinterest
 7. Distaste
 8. Happiness
 9. Liveliness
 10. Saddening
4. Look at the list of items you did not check. Come up with a definition of the Internet that encompasses these items as well. To help you do this, you can write about each

word individually. If you checked all the items, please explain how all of these items are considered part of the Internet.

5. "On the Internet, there is a stable, holistic, homeostatic community capable of preserving its natural balance more or less indefinitely"

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

6. "I am part of the Internet"

To what extent do you think this statement is true?

1-Not True 2-Slightly Not True 3-Neither True nor False 4-Slightly True 5-True

Please explain your answer. Please be as specific as possible and give examples.

7. Please use the remaining time to write about your role in the technological world. (ex. How are you part of the technological world? Do you like considering yourself a part of the technological world? How have your ideas about your role in the technological world changed over the past four days of writing?)

Appendix I

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, that is, at the present moment. Use the following scale to record your answers.

1- very slightly or not at all 2- a little 3- moderately 4- quite a bit 5- extremely

_____ interested

_____ distressed

_____ excited

_____ upset

_____ strong

_____ guilty

_____ scared

_____ hostile

_____ enthusiastic

_____ proud

_____ irritable

_____ alert

_____ ashamed

_____ inspired

_____ nervous

_____ determined

_____ attentive

_____ jittery

_____ active

_____ afraid

Appendix J

Demographics Questionnaire

1. What is your age in years? _____
2. What is your gender? _____
3. Is English your first language? _____
4. Which of these best describes your ethnic background?
 - a. White, non Hispanic
 - b. Black or African American
 - c. American Indian or Alaskan Native
 - d. Native Hawaiian or Pacific Islander
 - e. Asian
 - f. Hispanic or Latino
 - g. Arab
 - h. Other
5. What year are you?
 - a. Freshman
 - b. Sophomore
 - c. Junior
 - d. Senior
6. Where are you from?
7. What are your major(s) and minor(s)? If you are undeclared please write what major you would like. _____
8. What extracurricular activities are you involved with that are a 2-hour per week time commitment or more?

The Scales Basic Need Satisfaction in General

Please read each of the following items carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond:

1 2 3 4 5 6 7 (1= not true at all, 4 = somewhat true, 7 = very true)

1. I feel like I am free to decide for myself how to live my life.
2. I really like the people I interact with.
3. Often, I do not feel very competent.
4. I feel pressured in my life.
5. People I know tell me I am good at what I do.
6. I get along with people I come into contact with.
7. I pretty much keep to myself and don't have a lot of social contacts.
8. I generally feel free to express my ideas and opinions.
9. I consider the people I regularly interact with to be my friends.
10. I have been able to learn interesting new skills recently.
11. In my daily life, I frequently have to do what I am told.
12. People in my life care about me.
13. Most days I feel a sense of accomplishment from what I do.
14. People I interact with on a daily basis tend to take my feelings into consideration.
15. In my life I do not get much of a chance to show how capable I Am.
16. There are not many people that I am close to.
17. I feel like I can pretty much be myself in my daily situations.
18. The people I interact with regularly do not seem to like me much.
19. I often do not feel very capable.
20. There is not much opportunity for me to decide for myself how to do things in my daily life.
21. People are generally pretty friendly towards me.

Scoring information. Form three subscale scores, one for the degree to which the person experiences satisfaction of each of the three needs. To do that, you must first reverse score all items that are worded in a negative way (i.e., the items shown below with (R) following the items number). To reverse score an item, simply subtract the item response from 8. Thus, for example, a 2 would be converted to a 6. Once you have reverse scored the items, simply average the items on the relevant subscale. They are:

Autonomy: 1, 4(R), 8, 11(R), 14, 17, 20(R)

Competence: 3(R), 5, 10, 13, 15(R), 19(R)

Relatedness: 2, 6, 7(R), 9, 12, 16(R), 18(R), 21