Design for Inclusion, Vol. 75, 2023, 246–253
https://doi.org/10.54941/ahfe1003346

Understanding Students' Diversity in Inclusive Design: A Review of Literature on Students' Empathy and Prosocial Motivation From Cultural Differences

Hye Jeong Park[1], Huiwon Lim[2], and Yongyeon Cho[3]

[1]University of Northern Colorado, Greeley, CO 80639, USA
[2]Pennsylvania State University, University Park, PA 16802, USA
[3]Iowa State University, Ames, IA, 50011, USA

ABSTRACT

The goal of inclusive design is "design for all," and it has been considered a valuable approach to universal design and user-centered design in engineering design education. Although there are diverse methods to achieve the goal of inclusive design, individuals' diverse cultural backgrounds, empathy, and prosocial motivation are essential. The aim of this study is to investigate how engineering students' cultural backgrounds (collectivism and individualism) can be intertwined in classrooms and promote students' empathy and prosocial motivation for generating inclusive design solutions. Through the review of previous studies, students with collectivist cultures represented a higher empathy degree, and they frequently perceived prosocial motivation for others rather than students from individualist cultures. To amplify engineering students' empathy and prosocial motivation with respecting their cultural differences, this study followed the "three needs" of Oxford and Gkonou (2018) to suggest teaching methods for engineering design education. Diverse types of in- and outside-class activities, such as class discussions, role-playing, sharing students' own stories, and problem-based learning are recommended for enhancing students' empathy and prosocial motivation to understand others with diverse perspectives for inclusive ideas.

Keywords: Empathy, Prosocial motivation, Diversity, Cultural differences, Teaching strategies, Inclusive design, Engineering design education

INTRODUCTION

"Design for all" is the goal of inclusive design to create beautiful and functional environments that can be applied to everyone without age and gender differences and disabilities (Persson et al., 2015). In other words, Persson et al. (2015) stated that inclusive design should engage users in the design process by focusing on their needs, desires, and expectations. In line with this, many studies have primarily considered designing products for disabilities (Fuglerud et al., 2020; Nelissen et al., 2017; Persson et al., 2015); however, it is significant to understand designers' cultural backgrounds that influence generating and determining ideas.

As the world becomes increasingly diverse and becomes globalization, there are many international students over the world. Several studies compared international and domestic students and demonstrated that international students showed higher abilities of adaptability, motivation, ambitions, open-mindedness, intercultural awareness, expansion of worldview, building relationships, social responsibility, and understanding of cultural and racial differences than domestic students (Feld et al., 2021; Hovdhaugen & Wiers-Jenssen, 2021).

International students can build unique learning environments and bring benefits to their classrooms. In other words, interactions between peers from different nations and cultures allow them to have cross-cultural perspectives, identify social problems, and be willing to help other students who need help (Dunne, 2013). In addition, student diversity can drive higher levels of empathy and creativity related to idea generation and problem-solving ability, developing new skills, openness, and building cross-cultural sensitivity (Dunne, 2013; Gerson & Neilson, 2014; Luo & Jamieson-Drake, 2009; McBurnie, 2000).

In regard to students' diverse backgrounds, individuals with collectivistic cultural backgrounds, other-focused, tend to be more influenced by social obligations, maintaining a positive relationship with in-group members, and avoiding loss of collective relationships compared to those with individualistic cultural backgrounds, self-focus (Böhm et al., 2016; Duan et al., 2008). In line with this, depending on cultural differences, students may be differently perceived empathy and prosocial motivation, and it will affect the generation of inclusive design solutions. Therefore, engineering design education should focus on developing curricula to promote students' empathy and prosocial motivation with respecting cultural differences and how to engage them in classrooms to generate inclusive design ideas for their users. To answer the call for more research on how culture impacts engineering students' empathy and prosocial motivation, the current study examined traits of collectivism-individualism cultures and the relationship among empathy, prosocial motivation, and those cultures in inclusive design.

The study has two primary goals of understanding: 1) cross-cultural perspectives and their influence on students' empathy and prosocial motivation and 2) how student diversity in classrooms affects their creative and inclusive design solutions. The current study performed a review of the literature to achieve these goals and suggested teaching strategies to foster students' empathy and prosocial motivation in engineering design education.

INCLUSIVE DESIGN

Inclusive Design in Higher Education

Inclusive design, also called universal design or design for all, includes diversity and equality in the design process (Erkilic & Durak, 2013). In other words, the primary concept of inclusive design is to create products, environments, services, and experiences for a wide range of people considering their ease of use and emotions (Patrick & Hollenbeck, 2021; Clarkson & Coleman, 2015). Within the educational context, there have

been many efforts to incorporate inclusive design into the curricula across fields, including Human Factors and design studios.

Human Factors (or Ergonomics) field aims to enhance users' life quality using technology and their environments (Kroemer et al., 2001). Bilkent University offers a Human Factors course in Interior Architecture and Environmental Design department to teach principles of inclusive design using theoretical and practical applications. Similarly, other institutions incorporated inclusive design knowledge into Architecture and Interior Design studios targeting to develop students' awareness of human diversity (Altay & Demirkan, 2014).

Diversity in Inclusive Design

To include diverse users in the design process, Treviranus (2018) suggested a three-dimensional framework: (1) Focusing on human uniqueness and variability through recognition, respect, and design; (2) working with diverse people who have different perspectives; and (3) understanding the current design system. The framework can be successfully applied to the design process toward designers' empathic attitude (Patrick & Hollenbeck, 2021).

From the second factor of the three-dimensional framework by Treviranus (2018), the designer's role is significant since designers pay attention to identifying users' needs and avoiding potential design problems (e.g., usability; Norman, 2013). Accordingly, designers should understand diverse users' intentions and emotions, and it drives design teams that should consider involving designers who hold diverse perspectives and experiences. Diversity in design teams will have several benefits, such as having a holistic view and empathic mindset that allow for generating inclusive solutions (Patrick & Hollenbeck, 2021).

EMPATHY, PROSOCIAL MOTIVATION, AND DIVERSITY

Empathy and Prosocial Motivation in Inclusive Design

Many studies have considered empathy as a multidimensional competence to understand others' emotions (affective component) and their situations (cognitive components) across domains (Alzayed et al., 2021; Chopik et al., 2017; Davis, 1983; Decety & Lamm, 2006). According to Davis (1983), empathy has four tendencies: Fantasy scale, which is an ability to imagine fictitious characters' feelings and situations; perspective taking that allows adopting others' perspectives; empathic concern, which is the capability to emotionally concern (e.g., warmth and compassion) for others; and personal distress, an individual's negative feelings (e.g., fear and anxiety) from others' negative experiences. These four empathy tendencies demonstrated that they significantly impact undergraduate engineering students' design skills to generate design solutions for their users (Raviselvam et al., 2016, 2017; Surma-Aho et al., 2018).

With respect to this, from an educational viewpoint, promoting empathy can benefit engineering students' diverse perspectives. Previous research has identified that empathy supports students' deeper understanding of design

problems, influences the ability to define problems, and generates creative ideas with a user-centered approach (Fila & Hess, 2016; Johnson et al., 2014; Walther et al., 2012). Empathy also encourages students' curiosity and motivation to help others in engineering design education (Alzayed et al., 2021).

Prosocial motivation is the desire to benefit others, and its goal is to foster others' well-being, which is typically aroused by interaction with others who need support (Grant, 2008). Accordingly, prosocial motivation is strongly correlated with empathy, and they make synergy when they are synthesized in the design process. Several studies demonstrated that individuals who took others' perspectives and perceived prosocial motivation tend to generate more creative ideas, determine useful applications, explore new problem-solving strategies, and be willing to take challenges for others (Forgeard & Mecklenburg, 2013; Grant & Berry, 2011). Therefore, the role of empathy and prosocial motivation is significant in inclusive design. Accordingly, teaching strategies for empathy and prosocial motivation should be significantly considered to arouse students' empathy and prosocial motivation in engineering design education.

Cultural Backgrounds and Relation to Empathy and Prosocial Motivation

Students' cultural backgrounds affect their degrees of empathy and prosocial motivation. For example, Asians tend to show higher collectivism, empathy, agreeableness, and prosocial behavior than Western individualism (Chopik et al., 2017; Heinke & Louis, 2009). Similarly, students from collectivist cultural backgrounds showed a positive correlation to empathic concern for their clients as well as took others' perspectives and certain circumstances frequently (Duan et al., 2008). To expand this literature related to prosocial motivation, Liao et al. (2022) investigated that individuals with collectivist cultures showed more prosocially motivated than those with individualistic cultures. It can be interpreted that a person in collectivist culture pursues public goals rather than personal benefits, which drives them to make better decisions for the welfare of others (Liao et al., 2022). Taking it all together, students who focus on other-oriented cultures can better capture their users' needs and emotions and can be more frequently perceived prosocial motivation when they are in the stage of defining problems, generating ideas, and determining solutions than students with individualistic cultures in the inclusive design process.

TEACHING STRATEGIES TO DEVELOP EMPATHY AND PROSOCIAL MOTIVATION

With globalization in higher education, universities should consider students' diverse cultural backgrounds and provide appropriate teaching techniques to enhance students' empathy and prosocial motivation for generating inclusive design solutions. For this section, this study reviewed the differences between

collectivist and individualist cultures in order to suggest teaching strategies for developing both international and domestic engineering students' empathy and prosocial motivation in engineering design classrooms.

Regarding the interaction methods, individuals from other-oriented and self-oriented cultures showed different communication styles that significantly influence empathy and prosocial motivation. Oxford and Gkonou (2018) argued that collectivist cultures tend to show high-context communication (e.g., indirect and nonlinear); on the other hand, individualist cultures show low-context communication (e.g., direct and linear). It is key to be aware of individuals' different communication styles based on their cultures to understand others with diverse perspectives and better capture their needs and emotions. Therefore, understanding cultural-based communication styles is important to understand users and their emotions to generate and synthesize user-oriented ideas in the design process. It also should be highlighted in classrooms.

For educational strategies, the current study followed the teaching guidelines of Oxford and Gkonou's (2018) "three needs," *cognitive flexibility, ethnocultural empathy,* and *intercultural understanding* to suggest teaching strategies about how to enhance students' empathy and prosocial motivation who have different cultural backgrounds for inclusive design ideation.

Cognitive flexibility allows individuals to build new categories and perceive more than one culture; thus, it is strongly associated with perspective taking (Oxford & Gkonou, 2018). To facilitate engineering students' empathy and prosocial motivation in the first need, this study suggests collaborative projects, role-playing, and conducting interviews. Particularly, collaborative projects and role-playing will provide an opportunity for students to integrate their knowledge and diverse skills through communication and have indirect experiences of other cultures. Interviewing will help students capture others' perspectives and emotions. These techniques will allow students to enhance their perspective taking, empathic concern, and prosocial motivation. In line with this, students can effectively take others' perspectives and emotions and apply them to generate creative and useful ideas for others.

Ethnocultural empathy, which has been investigated to identify cultural similarities and differences from individuals' basic empathy, can influence the classroom atmosphere when students care about each other and respect other cultures (Oxford & Gkonou, 2018). Since empathy allows students to feel others' emotions in other cultures, the current study suggests humanity-based assignments and projects that can encourage students' empathy and prosocial motivation. For example, documentaries and sharing students' own stories with the entire class (Oxford & Gkonou, 2018) will help students learn about other cultures and have indirect experiences. The methods will help students reduce the gap between different cultures and integrate stories for idea generation in the inclusive design process. The strategies also can influence to foster students' fantasy scale, perspective taking, empathic concern, and prosocial motivation.

Intercultural understanding is the third need to develop students' empathy and prosocial motivation both in and outside classrooms. In this need,

the teaching strategy focuses on developing students' perception of respecting others' differences, such as languages and cultures (Oxford & Gkonou, 2018). As a recommended strategy, problem-based learning (PBL) is suggested for the engineering design curriculum. PBL focuses on open-ended tasks that require students to have critical thinking skills and allows identify issues and develop, evaluate, and select ideas through individual and group work and discussions (Dolmans et al., 2016; McCurdy et al., 2020). Accordingly, engineering students can expand their cultural perspectives empathetically through communications and consistently perceive prosocial motivation, which will affect generating inclusive design outcomes.

CONCLUSION

Understanding the different cultural backgrounds is critical to enhancing engineering students' empathy and prosocial motivation for inclusive design solutions. This study reviewed how student diversity with collectivist and individualist cultures shows different aspects of empathy and prosocial motivation and how they can be interwoven in inclusive design. This study followed the "three needs," cognitive flexibility, ethnocultural empathy, and intercultural understanding of Oxford and Gkonou (2018) to suggest teaching methods for developing students' empathy and prosocial motivation. In the first need, cognitive flexibility, collaborative work, role-playing, and interview are recommended to arouse students' perspective taking, empathic concern, and prosocial motivation; in ethnocultural empathy, humanity-based assignments and projects are suggested to develop students' fantasy scale, perspective taking, empathic concern, and prosocial motivation; and, PBL is recommended in intercultural understanding to promote students' communication skills, overall empathy, and prosocial motivation for inclusive design ideation in engineering design education. These recommended strategies should be considered to encourage students' empathy and prosocial motivation based on cultural differences to generate valuable design solutions for "all".

REFERENCES

Altay, B. and Demirkan, H. (2014) "Inclusive design: developing students' knowledge and attitude through empathic modelling," International journal of inclusive education, 18(2), pp. 196–217. doi: 10.1080/13603116.2013.764933.

Alzayed, M. A. et al. (2021) "Are you feeling me? An exploration of empathy development in engineering design education," Journal of mechanical design (New York, N. Y.: 1990), 143(11), pp. 1–57. doi: 10.1115/1.4048624.

Böhm, R. et al. (2016) "Exploring and promoting prosocial vaccination: A cross-cultural experiment on vaccination of health care personnel," BioMed research international, 2016, p. 6870984. doi: 10.1155/2016/6870984.

Chopik, W. J., O'Brien, E. and Konrath, S. H. (2017) "Differences in empathic concern and perspective taking across 63 countries," Journal of cross-cultural psychology, 48(1), pp. 23–38. doi: 10.1177/0022022116673910.

Clarkson, P. J. and Coleman, R. (2015) "History of inclusive design in the UK," Applied Ergonomics, 46, pp. 235–247.

Davis, M. H. (1983) "Measuring individual differences in empathy: Evidence for a multidimensional approach," Journal of personality and social psychology, 44(1), pp. 113–126. doi: 10.1037/0022-3514.44.1.113.

Decety, J. and Lamm, C. (2006) "Human empathy through the lens of social neuroscience," TheScientificWorldJournal, 6, pp. 1146–1163. doi: 10.1100/tsw.2006.221.

Dolmans, D. H. J. M. et al. (2016) "Deep and surface learning in problem-based learning: a review of the literature," Advances in health sciences education: theory and practice, 21(5), pp. 1087–1112. doi: 10.1007/s10459-015-9645-6.

Duan, C., Wei, M. and Wang, L. (2008) "The role of individualism-collectivism in empathy: An exploratory study," Asian Journal of Counselling, 15(1), pp. 57–81.

Dunne, C. (2013) "Exploring motivations for intercultural contact among host country university students: An Irish case study," International journal of intercultural relations: IJIR, 37(5), pp. 567–578. doi: 10.1016/j.ijintrel.2013.06.003.

Erkilic, M. and Durak, S. (2013) "Tolerable and inclusive learning spaces: an evaluation of policies and specifications for physical environments that promote inclusion in Turkish Primary Schools," International journal of inclusive education, 17(5), pp. 462–479. doi: 10.1080/13603116.2012.685333.

Feld, J. A. et al. (2021) "Doctor of Physical Therapy student perceptions of domestic versus international service-learning experiences: A mixed-methods approach," Journal of allied health, 50(3), pp. 203–212.

Fila, N. and Hess, J. (2016) "In their shoes: Student perspectives on the connection between empathy and engineering," in 2016 ASEE Annual Conference & Exposition Proceedings. ASEE Conferences.

Forgeard, M. J. C. and Mecklenburg, A. C. (2013) "The two dimensions of motivation and a reciprocal model of the creative process," Review of general psychology: journal of Division 1, of the American Psychological Association, 17(3), pp. 255–266. doi: 10.1037/a0032104.

Fuglerud, K. S. et al. (2020) "Co-creating persona scenarios with diverse users enriching inclusive design," in Lecture Notes in Computer Science. Cham: Springer International Publishing, pp. 48–59.

Gerson, M. W. and Neilson, L. (2014) "The importance of identity development, principled moral reasoning, and empathy as predictors of openness to diversity in emerging adults," SAGE open, 4(4), p. 215824401455358. doi: 10.1177/2158244014553584.

Grant, A. M. (2008) "Does intrinsic motivation fuel the prosocial fire? Motivational synergy in predicting persistence, performance, and productivity," The Journal of applied psychology, 93(1), pp. 48–58. doi: 10.1037/0021-9010.93.1.48.

Grant, A. M. and Berry, J. W. (2011) "The necessity of others is the mother of invention: Intrinsic and prosocial motivations, perspective taking, and creativity," Academy of Management Journal, 54(1), pp. 73–96. doi: 10.5465/amj.2011.59215085.

Heinke, M. S. and Louis, W. R. (2009) "Cultural background and individualistic-collectivistic values in relation to similarity, perspective taking, and empathy," Journal of applied social psychology, 39(11), pp. 2570–2590. doi: 10.1111/j.1559–1816.2009.00538.x.

Hovdhaugen, E. and Wiers-Jenssen, J. (2021) "Those who leave and those who stay: Features of internationally mobile vs. Domestic students," Journal of international students, 11(3), pp. 687–705. doi: 10.32674/jis.v11i3.2199.

Johnson, D. G. et al. (2014) "An experimental investigation of the effectiveness of empathic experience design for innovative concept generation," Journal of mechanical design (New York, N. Y.: 1990), 136(5), p. 051009. doi: 10.1115/1.4026951.

Kroemer, K. H., Kroemer, H. B. and Kroemer-Elbert, K. E. (2001) Ergonomics: How to design for ease and efficiency. Pearson College Division.

Liao, H. et al. (2022) "Feeling good, doing good, and getting ahead: A meta-analytic investigation of the outcomes of prosocial motivation at work," Psychological bulletin, 148(3–4), pp. 158–198. doi: 10.1037/bul0000362.

Luo, J. and Jamieson-Drake, D. (2009) "A retrospective assessment of the educational benefits of interaction across racial boundaries," Journal of college student development, 50(1), pp. 67–86. doi: 10.1353/csd.0.0052.

McBurnie, G. (2000) "Pursuing internationalization as a means to advance the academic mission of the university: An Australian case study," Higher education in Europe, 25(1), pp. 63–73. doi: 10.1080/03797720050002215.

Mccurdy, R. P., Nickels, M. L. and Bush, S. B. (2020) "Problem-based design thinking tasks: Engaging student empathy in STEM," The Electronic Journal for Research in Science & Mathematics Education, 24(2), pp. 22–55.

Nelissen, P. T. J. H. et al. (2017) "Lending a helping hand at work: A multilevel investigation of prosocial motivation, inclusive climate and inclusive behavior," Journal of occupational rehabilitation, 27(3), pp. 467–476. doi: 10.1007/s10926-016-9680-z.

Norman, D. (2013) The design of everyday things: Revised and expanded edition. New York, NY: Basic Books.

Oxford, R. L. and Gkonou, C. (2018) "Interwoven: Culture, language, and learning strategies," Studies in Second Language Learning and Teaching, 8(2), pp. 403–426.

Patrick, V. M. and Hollenbeck, C. R. (2021) "Designing for all: Consumer response to inclusive design," Journal of consumer psychology: the official journal of the Society for Consumer Psychology, 31(2), pp. 360–381. doi: 10.1002/jcpy.1225.

Persson, H. et al. (2015) "Universal design, inclusive design, accessible design, design for all: different concepts—one goal? On the concept of accessibility—historical, methodological and philosophical aspects," Universal access in the information society, 14(4), pp. 505–526. doi: 10.1007/s10209-014-0358-z.

Raviselvam, S. et al. (2017) "Demographic factors and their influence on designer creativity and empathy evoked through user extreme conditions," in Volume 7: 29th International Conference on Design Theory and Methodology. American Society of Mechanical Engineers.

Raviselvam, S., Hölttä-Otto, K. and Wood, K. L. (2016) "User extreme conditions to enhance designer empathy and creativity: Applications using visual impairment," in Volume 7: 28th International Conference on Design Theory and Methodology. American Society of Mechanical Engineers.

Surma-Aho, A., Björklund, T. and Holtta-Otto, K. (2020) "Assessing the development of empathy and innovation attitudes in a project-based engineering design course," in 2018 ASEE Annual Conference & Exposition Proceedings. ASEE Conferences.

Treviranus, J. (2018) The three dimensions of inclusive design: A design framework for a digitally transformed and complexly connected society.

Walther, J., Miller, S. and Kellam, N. (2020) "Exploring the role of empathy in engineering communication through a transdisciplinary dialogue," in 2012 ASEE Annual Conference & Exposition Proceedings. ASEE Conferences.