



## Zero-Waste Design Collaboration: An Investigation using CoSpaces Collaborative Working Model

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*Statement of Purpose* - Design approaches vary significantly across our discipline. This research investigated the application of a collaboration theory to validate an innovative technique of sustainable apparel product development and production. Collaborative work can be beneficial to increase productivity when compared to individualized work (Baumeister et. al, 2016); however, effectiveness can vary greatly based on situational variables. Patel et al. (2012) identified seven *categories of factors* involved in collaboration: Context, Support, Tasks, Interaction Processes, Teams, Individuals, and Overarching Factors in the CoSpaces Collaborative Working Model (CCWM).

Design scholarship, like other types of research, involves testing theory through producing artifacts (Bye, 2010). Collaborative work has strong potential in creative scholarship, as the collaboration advances the body of knowledge more quickly when multiple scholars are working in a single area. This study follows a group of design scholars that was formed around a common interest in zero-waste pattern design. The impetus for the formation was for five of the scholars to implement a technique discovered by the sixth designer as a way of further testing and validating the technique. The goal of this study is to investigate how the CCWM factors (Patel et al., 2012) functioned in this collaboration. This paper will provide an overview of the work being done by the ZW team and shed light on why this team has been successful based on the 7 factors identified in the CCWM.

*Methods* - A team of design scholars was identified and invited to participate in the validation of the Carrico Zero-waste Banded Grading (CZWBG) technique of sustainable apparel product development and production. As collaborative research can provide both successes and challenges, the seven categories of factors (Patel et. al, 2012) were identified and evaluated through the CCWM lens. The CCWM model was applied through each individual workflow and across the total workflow. In this study, data were collected in multiple formats throughout the design collaboration process. Data were collected using design logs and recorded meetings. Collected data was analyzed by comparing the group's work with the CCWM factors as described by Patel, et. al. (2012).

*Results* –The CZWBG technique was initially created and tested by Carrico (2016) in early prototypes using various approaches. Upon pursuing publication of the initial work and a desired proof of concept, Carrico sought *Support (factor two)* from Dragoo to offer publishing expertise. Carrico and Dragoo then took on leadership roles and began to form a research *Team (factor three)* by identifying four additional members who had interests in sustainable methodologies and background in design prototyping. Scholars (McKinney, Stannard, Moretz, and Rougeaux-Burnes) were invited to join and asked to identify a niche category aligned with their *Individual (factor four)* design strengths in which to test the technique. To initialize the work, the scholars were provided *Context (factor one)* on the research and development of the technique. Over the duration of the study, the collaborative team accomplished multiple design phases.

Phase 1 began with the design team working in tandem to achieve the *Task (factor five)* of creating applicable designs using the CZWBG technique. The validation process used qualitative assessment and tracking documentation through individualized and group design progress. Design scholars *Interacted (factor six)* via regular video meetings to discuss initial ideas, highlight emerging concepts, discuss grading approaches, and problem solve possible issues. After receiving feedback from external evaluators, a postmortem meeting was held to discuss what was learned and set goals for the second phase of research.

Phase 2 endeavored to further refine and test the CZWBG technique. Each designer chose a new garment type within their original categories. Garments were designed incorporating feedback from the industry professional and peer reviewers with a focus on streamlining the ZW patterns for efficiency in a mass production setting.

Phase 3 commenced with the goal to test industrial production. Garments were designed incorporating further feedback from peer reviewers while continuing to streamline the ZW patterns for mass production. Design scholars developed a survey to evaluate industry applicability of the ZW patterns produced during Phase 3. The survey will be used to gather data and feedback from three industry professionals.

Across all three phases *Overarching factors (factor seven)* included subfactors *trust, accountability, and incentives*. Each designer met team expectations that built trust in the team relationships, accountability to each other for completing work on time, and incentives that included dissemination of research outcomes (1 published article, 11 juried exhibitions, and 1 innovative research award). Overall, the team shared in increasing the global awareness of sustainable design practice in the design field.

*Conclusions* - The team of scholars found that each of the *collaboration factors* (Patel et. al., 2012) was critical at the start of Phase 1; as the work progressed into Phase 2, some factors gained importance while others subsided. *Context*, of course, determined the team and defined the problem to solve. The *Contextual* subfactors of individual autonomy over one's design and semi-self-paced work were benefits. *Support* provided by the leaders to educate other team members in the CZWBG technique was essential. Each scholar accepted the *Task* of creating ZW garments and took on additional tasks related to disseminating results. *Tasks* were identified as a key component of the process during Phase 2. Across all phases, the *Interaction processes* were crucial for team members sharing progress and receiving feedback through Zoom meetings.

The success of the *Team* was due to the *Individual* performance of the scholars and their ability to accomplish interdependent tasks. *Overarching factors* of trust, accountability, and experience played a vital role in the team success. The majority of the 7 factors identified in the CCWM (Patel et. al, 2012) were found to support effective collaboration in the work being done by the design team, shedding light on why this team has been successful.

*Implications and Future Directions* – The seven factors of the CCWM can inform how other scholars may work collaboratively to increase the body of design knowledge. Future research could include investigating the CCWM with other collaborative design teams both within the apparel field and beyond. These factors would also be useful in classroom settings to aid students in collaborative group work. The current design team plans to continue work in this vein into phase 3 and future phases.

#### References

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