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INCREASING COLLEGE STUDENTS' EXPERIENCE OF FLOW WHILE COMPLETING ACADEMIC WRITING TASKS

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INCREASING COLLEGE STUDENTS' EXPERIENCE OF FLOW WHILE COMPLETING ACADEMIC WRITING TASKS

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INCREASING COLLEGE STUDENTS' EXPERIENCE OF FLOW WHILE COMPLETING ACADEMIC WRITING TASKS

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Flow is a state of consciousness where the individual experiences engagement, concentration, and enjoyment. An intervention was conducted focusing on challenge-skill balancing and intrinsic motivation, both previously conceptualized as aspects of flow. The variables evaluated were challenge-skill balance, concentration on task, flow, and intrinsic motivation. The study had 211 undergraduate college students (control = 104, intervention = 107). Repeated measures ANOVA was used to evaluate the data. The findings were mixed. Significant main effects between groups were not found. Significant main effects for time (pre-test to post-test) were found for challenge-skill balance, flow, and intrinsic motivation. A statistically significant change from pre-test to post-test for the control group on intrinsic motivation suggests the possible presence of a confounding effect by the control group curriculum. Some evidence was found that flow can be influenced by direct intervention. Further research is needed to clarify, evaluate, and extend these findings.

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Chapter 1

Introduction

The U.S. Department of Education's report *The Condition of Education 2014*, in the postsecondary education completions section, presented evidence suggesting challenges regarding retention and graduation rates for undergraduate students. The undergraduate student retention rate for first-time, full-time students that enrolled at 4-year degree-granting institutions in 2011 who returned in fall 2012 was 79%, ranging from 61% to 95% depending on selectivity of admissions (Kena, Aud, Johnson, Wang, Zhang, Rathbun, Wilkinson-Flicker, & Kristapovich, 2014). The 6-year graduation rate for first-time, full-time undergraduate students who started seeking a bachelor's degree at 4-year degree-granting institutions in fall of 2006 was 57% at public institutions, 66% at private nonprofit institutions, and 32% at private for-profit institutions (Kena, et al., 2014). The factors that influence these statistics are diverse and complex.

Finding ways to encourage students to stay in school and help them persist until completion of their degree is an important objective of educational psychologists. Research suggests that flow may be a useful construct for this endeavor. Studies have found that flow may be associated with concentration on task, intrinsic motivation, and performance. John Dewey in his book *Experience and Education* suggested that "Everything depends upon the *quality* of the experience which is had. The quality of any experience has two aspects. There is an immediate aspect of agreeableness or disagreeableness, and there is its influence upon later experiences" (Dewey, 1938, p. 27). In his work, Dewey brought attention to a fundamental aspect of education, the

educational experience itself. Mihaly Csikszentmihalyi (1975) in his book *Beyond Boredom and Anxiety* introduced a theory of experience that he called *flow*. His subsequent work conceptualized *flow* as "the state in which people are so involved in an activity that nothing else seems to matter; the experience itself is so enjoyable that people will do it even at great cost, for the sheer sake of doing it" (Csikszentmihalyi, 1990, p. 4). Csikszentmihalyi has presented various approaches to defining flow in his books over the years (Csikszentmihalyi, 1975, 1990, 1997, 2009). Flow has been conceptualized as a state of consciousness associated with active focus on, complete involvement in, and enjoyment of an activity. Flow embodies deep concentration, interest, and enjoyment (Shernoff & Csikszentmihalyi, 2009).

In the rest of this chapter, I provide an overview of the characteristics of flow and intrinsic motivation in order to elucidate the conceptual framework underpinning this study. I then present the rationale for the study.

Characteristics of Flow

Csikszentmihalyi (1975, 1990) postulated that flow has nine characteristics: a balance between challenge and skill, clear goals, unambiguous feedback, concentration on task, sense of control, merging of action and awareness, loss of self-consciousness, transformation of time, and autotelic experience. A balance between challenge and skill, clear goals, and unambiguous feedback are theorized to be key antecedents to a flow state. Concentration on task and sense of control are theorized also to be important aspects of flow state, whereas merging of action and awareness, loss of self-consciousness, transformation of time, and autotelic experience could be thought of as

experiential extensions of a flow state. The following discussion is meant to clarify these characteristics of flow.

When the skill of the individual performing an activity is in balance with the challenge of the activity, a state of challenge-skill balance exists. If the challenge of the present activity is significantly greater than the individual's present skill level, he or she may experience above average anxiety when engaged in this activity. Conversely, if the challenge of the activity is below the individual's skill level, he or she is more likely to experience boredom while doing the activity. A state of challenge-skill balance is achieved when there is a match between the challenge of the activity and the skill level of the participant.

Several studies have found evidence linking challenge-skill balance and flow (Guo & Ro, 2008; Moneta & Csikszentmihalyi, 1999; Waterman, Schwartz, Goldbacher, Green, Miller, & Philip, 2003). Over-challenge has been associated with anxiety, and under-challenge was associated with boredom (Csikszentmihalyi, Nakamura, & Bruya, 2009). Many times, individuals participate in an activity that is too challenging for their present skill level and this imbalance produces anxiety. Depending on the extent of imbalance, the anxiety may inhibit performance. Conversely, when a person participates in an activity that is well within his or her present skill level, he or she may experience boredom while performing the activity. Challenge-skill balance is thought to be a key antecedent of flow.

Another characteristic of flow is clear goals. When the individual has clearly defined performance objectives to strive to accomplish during the engagement of an

activity, he or she has clear goals. While engaged in the activity, clear goals reference the sequential goals or step-by-step goals necessary to reach the final goal successfully (Csikszentmihalyi et al., 2009). Challenging goals encourage the stretching of skills (Shernoff & Csikszentmihalyi, 2009). "Goals justify the effort they demand at the outset, but later it is the effort that justifies the goal" (Csikszentmihalyi, 1990, p. 224). Clear goals help create a coherent and non-contradictory direction of action: "Goals and means are logically ordered" (Csikszentmihalyi, 1975, p. 46). Shin (2006) found evidence to support that having clear goals made a significant difference in the level of flow experienced in a college, computer-mediated learning environment.

Clear goals, in the context of flow, focus more on performance goals for the activity than on outcome goals. When clear goals are addressed, they are referenced in terms of being as precise as possible in regard to performance goals for the activity, so that the individual has specific steps to take and specific action objectives. Also, clear goals help the person understand what level of performance on each of the subset skills is required during the engagement of the activity. Additionally, understanding incremental increases for which an individual is striving through the setting of clear goals will help him or her to define, be aware of, and look for specific performance feedback to refine performance.

When the individual is engaged in performing an activity and he or she is receiving feedback about performance in the activity so that adjustments can be made, unambiguous feedback is theorized to be present during the activity. Whenever engaged in an activity, individuals must process and interpret a complex stream of information so

that they can respond appropriately (Csikszentmihalyi et al., 2009). Deliberately evaluating the feedback of the senses and responding appropriately is core to creating flow on an ongoing basis (Csikszentmihalyi, 1990). Liu, Cheng, and Huang (2011) found evidence that students in flow frequently used feedback strategies for problem solving such as trial-and-error, learning-by-example, and analytical reasoning strategies. El, Tillema, and van Koppen (2012) found support for the association of formative feedback (i.e., monitoring and scaffolding) and intrinsic motivation.

Unambiguous feedback emphasizes that the individual should engage in an activity with mindfulness and should have a plan to monitor and evaluate performance feedback during the activity. Through challenge-skill balancing and setting and having clear goals, specific parameters become set for an activity so that the individual can discern unambiguous feedback (e.g., the difference between performance goals and actual performance) enabling him or her to adjust performance immediately in reference to the feedback, contributing to ongoing subsequent feedback adjustment cycles. Ongoing performance adaptations could include modifying challenge-skill balance, modifying goals, and creating different or additional unambiguous feedback options. Unambiguous feedback is a core component in the development of skill in that it creates an active and ongoing constructive feedback dynamic. Unambiguous feedback helps to increase the probability of flow.

Another component of flow, concentration on task, refers to the individual's ability to focus attention on the task at hand and be able to tune out other unrelated stimuli that are not relevant to the present activity (Csikszentmihalyi et al., 2009). In a

flow state attention seems effortless while engaged in the activity, whereas in other activities, the individual has to work to concentrate while accomplishing them (Csikszentmihalyi et al., 2009). Several studies have found that concentration is positively associated with challenge and skill (Abuhamdeh & Csikszentmihalyi, 2012; Moneta & Csikszentmihalyi, 1999). Activities that can facilitate sustained concentration for long periods of time are said to occur in a state of flow (Csikszentmihalyi, 1975).

Another characteristic of flow is a sense of control, a characteristic that is related to Bandura's agency conceptualization. Bandura (2006) proposed that human agency has four core properties: intentionality, forethought, self-reactiveness, and self-reflectiveness. Intentionality embodies forming action plans and choosing strategies to facilitate achieving the objective. Forethought encompasses future-directed planning. The agent sets goals and anticipates outcomes and uses this information to motivate and guide actions. Self-reactiveness focuses on motivating and regulating execution of plans and strategies. Self-reflectiveness emphasizes examination of personal functioning. Banduras' conceptualization of agency gives perspective on the scope of individual agency. Another parallel concept is Deci and Ryan's autonomy. Autonomy is focused on personal endorsement of one's own actions and emphasizes that a more complete, integrated functioning may be facilitated by the individual taking personal ownership and responsibility for his or her actions (Deci & Ryan, 1987). When the decision to take a certain route is perceived to be the individual's choice, flow is likely to occur. If there are feelings of external coercion, flow could be inhibited (Csikszentmihalyi, 1990).

Sense of control suggests that the performer must be able to make choices and have control over his or her actions.

Flow is also characterized as showing a merging of action and awareness, loss of self-consciousness, transformation of time, and autotelic experiences. Action-awareness merging refers to the propensity of flow to create high levels of concentration and engagement to the point where action and awareness merge (Csikszentmihalyi, 1975, 1990). The distinction between the actor and the action fades away. Loss of self-consciousness indicates a diminished awareness of self when one is engaged in the activity (Csikszentmihalyi, 1975, 1990). This loss of self-consciousness is attributed to the fact that the activity is challenging the person to the edge of his or her ability, and there is no additional concentration bandwidth available to be conscious of self. Time transformation proposes that when individuals are experiencing flow, their perception of time is changed (Csikszentmihalyi, 1975, 1990). Time is distorted, either experienced as slowing down or as passing rapidly. During flow, the subjective experience of time is altered so that it seems to be in slow motion, with minutes seeming to last for hours. Finally, autotelic experience refers to the activity becoming rewarding because of the engagement in a challenging performance rather than simply engaging in the activity to achieve the desired completion rewards of the activity (Csikszentmihalyi, 1975, 1990). The individual finds that simply performing the activity is a rewarding experience, enjoyable in and of itself.

These characteristics denote the experience of flow state (i.e., an effective amalgam of challenge-skill balance, clear goals, unambiguous feedback, concentration on

task, sense of control, merging of action and awareness, loss of self-consciousness, transformation of time, and autotelic experience).

Connecting Intrinsic Motivation, Challenge-Skill Balance, and Flow

Ryan and Deci (2000) defined intrinsic motivation as engaging in an activity for its inherent satisfaction (i.e., fun or challenge) rather than for external consequences (i.e., pressure or rewards). Intrinsic motivation emphasizes internal or personal motives for performing an activity. Underpinning intrinsic motivation is the premise that individuals may pursue activities and perform more effectively in contexts that provide an optimal level of stimulation (Deci & Ryan, 1985). An individual's perception of an activity as challenging, interesting, fun, or enjoyable may be referring to dimensions of intrinsic motivation.

Deci and Ryan (1985) conceptualized intrinsic motivation as dependent on basic needs for competence and self-determination that are associated with the emotions of interest and enjoyment and motivation to seek ongoing interactions that challenge one's capacities. The need for competence and the seeking of challenging activities may be related to challenge-skill balance in that fostering competence may require an individual to find or create activities that are proximal to his or her present skill level and that are perceived as fun or enjoyable in relation to satisfying competence needs. Intrinsic motivation may be associated with flow by its connection with positive affect (i.e., interest and enjoyment). Flow theory emphasizes the experience of enjoying the activity (Deci & Ryan, 1985). Several studies have found a significant association between flow and enjoyment (i.e., intrinsic motivation). The literature suggests that the reciprocal

relationship of challenge-skill balance, intrinsic motivation, and flow could be leveraged to structure and create flow in a variety of experiential contexts.

Rationale for the Study

With an introduction of the conceptual framework underpinning this study as the basis, a discussion of the experimental rationale is appropriate to connect challenge-skill balance and intrinsic motivation as the primary components of the intervention tested in this study.

Experiencing high levels of anxiety or being bored by a learning activity could contribute to student disengagement from that activity and from others like it. By contrast, those aspects of the flow paradigm that may be susceptible to manipulation could potentially contribute to increased student task resilience. For example, challenge-skill balancing could give students the ability to adjust themselves more accurately to the challenge of a task relative to their present skill level, potentially decreasing the likelihood of experiencing performance-inhibiting anxiety or task-disengaging boredom. Students could use challenge-skill balancing to adjust their approach to the activity, within the parameters of the assigned task, by breaking an overly challenging task into manageable segments or by adding complexity or time constraints to add challenge to a non-challenging activity.

The study of flow is related to the study of how to make laborious activities and work more enjoyable and, thus, intrinsically motivating (Csikszentmihalyi, 1975). Intrinsic motivation in learning contexts such as academic writing can be challenging to generate and maintain by the typical student (Csikszentmihalyi, 1990; Paris & Paris,

2001; Sanacore, 2008; Rakes & Dunn, 2010). The frustration of knowing what needs to be done yet not having the motivation to do it can be addressed by using flow as one's motivational engine (Csikszentmihalyi, 1975, 1990; Nakamura & Csikszentmihalyi, 2002). Flow may also be amenable to being structured and created in a mixed motivational environment. Some flow activities can be extrinsically motivated as well as intrinsically motivated (Csikszentmihalyi, 1975, 1990; Kowal & Fortier, 1999; Mannell, Zuzanek & Larson, 1988; Osterloh & Frey, 2000).

Flow, through its relationship with intrinsic motivation, can foster positive affect and stimulate positive educational outcomes (Buck, Carr, & Robertson, 2008; Shernoff & Anderson, 2013; Shernoff & Csikszentmihalyi, 2009). Ryan and Deci (2000) proposed that quality of learning and achievement may be related to intrinsic motivation.

The effortless concentration of flow has been reported during bouts of study and work that are typically perceived as effortful and obligatory (Csikszentmihalyi et al., 2009). Achievement and skill development in reference to more complex mental tasks may be promoted by the harnessing of concentration (Shernoff, Csikszentmihalyi, Shneider, & Shernoff, 2003). Flow can create situations where even difficult and extrinsically motivated activities can be experienced as enjoyable (Csikszentmihalyi, & LeFevre, 1989; Csikszentmihalyi et al., 2009; Shernoff et al., 2003).

Flow theory postulates that a person can learn the tools to structure activities to create flow (Csikszentmihalyi, 1975). According to Csikszentmihalyi (1990), creating flow is an ability that can theoretically be cultivated; it is a skill that is hypothesized to be amenable to development through training and discipline. Although flow theory suggests

that flow is malleable, there is little evidence in the literature regarding direct flow interventions in learning contexts. Perhaps, this may be due to a perception that sense of control and intrinsic motivation may contradict external efforts to influence flow. Flow theory suggests that developing the ability to structure flow is the more direct path to consistently achieving flow during an activity. Being interested and involved in an activity because the person finds it spontaneously enjoyable or interesting is the indirect path to flow whereas structuring flow by using challenge-skill balancing, clear goals, and unambiguous feedback is the direct path to flow (Csikszentmihalyi, 1975, 1990; Csikszentmihalyi et al., 2009).

A challenge of flow is that it is a subjective experience. Mastering subjective states requires an understanding of how they are shaped (Csikszentmihalyi, 1990). The structuring of activities to stimulate or encourage flow by one individual for another will inevitably yield inconsistent results. This is because the individual is the only one capable of customizing flow optimally for himself or herself. Because of the subjective aspect of flow, empowering students to structure flow for themselves could help them foster their own academic success while encouraging autonomous action and intrinsic motivation.

Given the theorized ability to structure flow individually and the potential benefits for learning, a flow intervention study was designed guided by Bandura's (1977, 1986, 1997) elements of an intervention. The study involved a direct intervention, focusing on challenge-skill balancing and intrinsic motivation. The flow literature suggests that these constructs may be central to structuring flow.

This study was a test of whether flow could be influenced in the context of academic writing. The research questions were: (a) Would a direct intervention on challenge-skill balancing and intrinsic motivation impact challenge-skill balance for the writing activity; (b) Would the intervention based on challenge-skill balancing and intrinsic motivation influence concentration on task for the writing activity; (c) Would the intervention based on challenge-skill balancing and intrinsic motivation enhance the experience of flow; and (d) Would the intervention based on challenge-skill balancing and intrinsic motivation influence intrinsic motivation.

This chapter introduced the construct of flow, the primary focus of this intervention study, and provided a rationale for the study. The next chapter presents a review of the relevant literature. Chapter 3 provides a description of the method of the study, and Chapter 4 presents the findings. I conclude in Chapter 5 with a discussion of the findings, the limitations of the study, and implications of the findings.

Chapter 2

Review of the Literature

This literature review explores research findings regarding the construct of flow and its underlying constructs of challenge-skill balancing and intrinsic motivation. I then review existing work specifically associated with key variables that are part of my research design for the study. I then conclude the chapter with a short summary.

Flow

To help structure the discussion of flow, the literature review has been segmented into the three contexts in which flow has been investigated in the research literature: leisure, work, and education.

Flow in the Leisure Environment

When one considers leisure situations, experiences of flow may come to mind. However, leisure does not necessarily entail flow. As one group of researchers found, satisfaction with the event may play an important role.

Chen, Ye, Chen, and Tung (2010) examined satisfaction-with-event as a mediator of flow and life satisfaction in the context of a leisure event, a Cirque du Soleil acrobatics show. Four hundred thirty-four audience members ranging in age from 18 to 76 years participated in the study. They found evidence to suggest that satisfaction with the event may fully mediate the relationship between flow and life satisfaction. Certain people may find that one event induces a flow state for them and another event does not stimulate flow. The subjective aspect of flow makes understanding the contextual factors that are conducive to the experience of flow and the cognitive and affective factors within the

individual that contribute to flow experience an important endeavor for someone who would like to create flow experiences for themselves or for others.

A possibly contradictory study is one by Heo, Lee, Pedersen, and McCormick (2010) that investigated how flow in the context of leisure, individual differences, social context, and location influenced the experience of flow in older adults ranging in age from 62 to 85 years. They found that retirement may have a significant negative relationship with flow. They also found that older adults may be more likely to experience flow at home. Additionally, they did not find a relationship between serious leisure and flow. However, more than half of the participants reported experiencing flow during casual leisure (e.g., housework, watching television, reading, and listening to music). One would not think that retirement would have a negative relationship with flow or that for older adults flow would be experienced at home rather than elsewhere. Also, that someone may experience flow during housework may be difficult for some people to understand. It is the nuances of flow that make it an intriguing and challenging subject of inquiry.

Computer games. Electronic games are a common context in which individuals report experiencing flow. They may not call it by that name, but flow is often associated with video game play. Computer games are one of the few instances that allow for a person easily and directly to set the challenge level of the experience. At the start of a game, the individual is asked to set the level of play. The typical settings are beginner, intermediate, or advanced. Computer games offer perspective and insight regarding the dimensions of flow and how to create it and sustain it.

Thin, Hansen, and McEachen (2011) explored flow while playing body movement controlled video games (BMCVG) in college students. These researchers found evidence to support the experience of flow during BMCVG. They also found that challenge-skill balance and action-awareness merging means were higher for BMCVG than for dance and non-competitive exercise activities. This research suggests that video games may be able to facilitate flow in physical action contexts and that BMCVG may be an avenue to encourage sedentary individuals to engage in physical activities and exercise.

Jin (2011) examined presence (i.e., physical presence, spatial presence, and self-presence) in relation to flow in a video game context in college students. She found that all three presence states may be associated with experiencing flow. She also found that challenge-skill balance induced greater flow and that involvement and focused attention may be important antecedents of flow. These findings suggest that flow is present across multiple gaming contexts. Also, by understanding the dimensions of flow associated with the various modalities of presence, video game creators may be able to design and customize the game experience to encourage, facilitate, and maintain flow.

Schmierbach, Limperos, and Woolley (2012) explored enhanced immersion (i.e., natural controls and customization) in relationship to enjoyment of a console racing game in college students. They found that the effect of enhanced immersion on enjoyment may be mediated by transportation (i.e., affective, cognitive, and mental imagery involvement) into the game experience and challenge-skill balance. By understanding how enjoyment

is experienced by the video game player, game engineers may be able to enhance the components of the game that support player enjoyment.

Hong, Pei-Yu, Shih, Lin, and Hong (2012) evaluated computer self-efficacy, competitive anxiety, and flow for an online game in college students. They found computer self-efficacy and game competitive anxiety explained 51.9% of the variance in flow for the online game. They also found that computer self-efficacy was negatively related to game competitive anxiety. These findings suggest that the skill development or competency building dimension of flow and the possible reduction of anxiety that such competency may represent some of the most important benefits of flow. However, there may be potential negative outcomes associated with flow, an area of research I explore next.

***Gaming addiction*.** There have been several studies exploring a possible association of flow with gaming addiction. Deep engagement and enjoyment could lead to compulsive behaviors.

Wan and Chiou (2006) examined flow in relation to online games addiction in high school and college students ranging in age from 16 to 23 years. They found that flow was negatively correlated with addictive inclination and flow was not a significant predictor of subsequent addictive inclination. They also found that online game addicts' flow state was significantly lower than the average online game player. Additionally, they found that compulsive use of online games may stem from relief of dissatisfaction rather than pursuit of satisfaction. These findings suggest that flow may not be

associated with addictive inclination and that other factors may contribute to compulsive use of electronic games.

Hull, Williams, and Griffiths (2013) examined video game characteristics, happiness, and flow as predictors of addiction among video game players. One hundred ten gamers participated with a mean age of 24.7 years. They found that decreases in general happiness were most predictive of increases in gaming addiction. Perception of time being altered was the only flow characteristic that was a significant predictor of gaming addiction, and the game characteristic of sociability was found to be associated with higher levels of gaming addiction. These findings suggest that isolation or loneliness may contribute to gaming addiction, but not flow.

Flow in the Work Environment

Our occupations encompass a significant part of our lives. Our jobs enable us to put food on the table and to have a roof over head. Our work can sometimes be repetitive (i.e., boring) and require a great deal of effort. Some occupations may, by the nature of their job activities, be more conducive to flow. Several researchers have explored flow in the work context.

Maeran and Cangiano (2013) looked at redesigning occupational tasks to facilitate flow to enhance job satisfaction. One hundred five workers participated in the study ranging in age from 21 to 64 years. Their findings suggested that flow could be a strong predictor of job satisfaction. Redesigning job activities to facilitate flow could positively affect worker job satisfaction. Another occupational utility of flow may be in the context of collaboration.

Aubé, Brunelle, and Rousseau (2014) explored the relationship between goal commitment and information exchange on flow in a project management simulation. Three hundred ninety-five undergraduate and graduate students participated with a mean age of 28.7 years. They found that flow was positively related to team performance and that the relationship between flow and team performance was mediated by team goal commitment and moderated by the level of information exchange among the members of the team. These findings suggest that flow may facilitate collaboration and work group performance.

Another potentially useful aspect of flow in the work context may be rejuvenation, as defined by "a state of feeling restored, renewed, and ready to start anew which remains beyond immediate participation in mood-repair activity" (Collier & von Károlyi, 2014, p. 475). Collier and von Károlyi (2014) explored rejuvenation from an engagement, arousal, and flow perspective in the occupational context of textile handcrafters ranging in age from 17 to 79 years. They found that textile handcraft activities that were reported as rejuvenating were also reported as arousing and engaging and that higher levels of arousal and engagement were related to higher levels of rejuvenation. They also found that the art maker group reported greater skill and challenge during art-making, self-realization of values, personal expressiveness, rejuvenation, and flow than the non-art maker group. The logical extension of these findings suggests that workers who are experiencing physical and/or cognitive burnout may be able to rejuvenate by structuring flow into their work activities. Another interesting aspect of this research was that by attributing various dimensions of meaning

or values to the job activities, workers (i.e., artists) experienced greater skill and challenge, self-realization of values, personal expressiveness, flow, and rejuvenation. Developing a greater understanding of flow in the work environment could possibly help maintain or increase productivity and enhance worker job satisfaction.

Flow in the Educational Environment

Music education. Many associate music intuitively with flow. Sinnamon, Moran, and O'Connell (2012) found that flow states may be experienced frequently by music students. Research has confirmed and elaborated on the relationship between flow and music.

For example, one study by Fritz and Avsec (2007) explored flow and subjective well-being of university music students. They found that several dimensions of dispositional flow (i.e., challenge-skill balance, clear goals, concentration on task, and autotelic experience) were positively related to measures of subjective well-being, explaining 36% of the variance. They also found that challenge-skill balance explained 26% of the variance in negative affect.

Understanding which dimensions of flow that may be more strongly associated with an overall flow experience could help the music student achieve and maintain flow and subjective well-being. Conversely, being aware of the factors that may be generating negative emotions could empower music students to use this information to refine their approach to their practice of music. Freer (2009) found evidence of high levels of perceived challenge, perceived skill, clear goals, deep personal involvement and

concentration, self-directedness, self-awareness, immediate feedback, and transformation of time among adolescent male choral music students.

Flow and music could encourage development of useful cognitive and metacognitive skills. Diaz and Silveira (2013) found evidence that high school music students experienced flow during a wide range of activities. However, musical academic activities were more conducive to flow than interpersonal activities. The highest ranking flow inducing activities demonstrated a moderate to strong relationship with attention and enjoyment. These findings suggest that flow may be experienced during a wide variety of activities and that attention and enjoyment may be strongly associated with flow.

Wrigley and Emmerson (2013) examined students' experience of flow after music performance examinations. Two hundred thirty- six undergraduate and graduate students participated in the study ranging in age from 16 to 47 years. They found that most students did not believe that their skills matched the challenge of the performance, and most did not experience the performance as absorbing or enjoyable. These findings suggest that certain contexts such as performance evaluations may inhibit flow, supporting the claim that an imbalance between challenge and skill may inhibit flow.

Additionally, Fullagar, Knight, and Sovern (2013) investigated challenge-skill balance, flow, and performance anxiety for college student musicians over the course of a semester. They found that skill may moderate the relationship between challenge, flow, and performance anxiety. They also found that high flow may be associated with low performance anxiety, and high performance anxiety may be related to low experiences of flow. These findings suggest that performance anxiety could be ameliorated by practice

(i.e., skill development). The relationship of flow to the practice of making music has revealed additional situational dynamics and dimensions of flow.

Physical education. Being in the zone is a common term used in various areas of physical education, a term that seems to refer to flow. There is a significant amount of literature regarding flow in the physical education context about a wide variety of topics. I have selected several here to limit the focus and scope to topics relevant to this study.

For example, there is the issue of whether flow can be controlled. Russell (2001) found evidence that college athletes perceived flow to be less controllable than for elite athletes. This finding suggests that college athletes may not understand how to structure and create flow.

Stavrou, Jackson, Zervas, and Karteroliotis (2007) evaluated the orthogonal model of flow (i.e., apathy, anxiety, relaxation, and flow); the associations among challenge, skill, and flow; and the relationship between flow and performance in athletes ranging in age from 16 to 38 years. They found the flow and relaxation states to be the most optimal states for athletes to experience flow, and the apathy state the least optimal states for athletes to experience flow. Additionally, they found a low correlation between performance and challenge of the game. Also, athletes' skills were moderately correlated with flow. Their analyses suggested that flow significantly predicted performance. These findings suggest that high personal skill and high task challenge may be the optimal situation for experiencing flow and that low personal skill and low task challenge may inhibit the experience of flow. Skill, flow, and performance may be linked. Understanding their relationship could increase performance.

Elbe, Strahler, Krustrup, Wikman and Stelter (2010) explored flow in relation to different types of physical activity (i.e., continuous running, football, interval running, and strength training) in adults with a mean age of 34.5 years. They found that all groups experienced high levels of flow regardless of whether it was a team or individual sport. These findings provide additional evidence that flow may be attainable in a wide variety of activities and group contexts.

Koehn, Morris, and Watt (2013a) investigated the relationship between flow and confidence, imagery use, and action control in tennis player ranging in age from 11 to 18 years. They found that imagery and confidence accounted for 34.2% of the variance in dispositional flow. These findings suggest imagery (i.e., visualization) and confidence (i.e., perceived skill) could help create a disposition to experience flow. Visualizing performance and building confidence may be useful strategies for structuring and creating flow.

Computers in education. The research focusing on leisure computer gaming has already been discussed in this chapter. This section summarizes some of the most relevant research on flow in the context of computers and learning.

Shin (2006) explored flow in relation to a college online learning course. She found that students' perceptions of their level of skill and the challenge of the specific course to be critical in determining the level of flow that they experienced. She also found that flow was a significant predictor of course satisfaction. These findings suggest that understanding challenge-skill balance may be an important factor in achieving flow and that achieving flow could facilitate increased satisfaction with a course.

Liao (2006) found evidence to support the presence of flow in a college distance learning environment. She also found that skill, challenge, control, and interactivity accounted for 40.8% of the variance of measures of flow. These findings suggest that challenge-skill balance, sense of control, and interactivity may be useful for generating flow in this context.

Kiili and Lainema (2008) evaluated flow in a university educational game context. They found evidence that challenge and feedback may significantly support flow experiences in the educational game context. These findings suggest that challenge-skill balance and unambiguous feedback may be important for creating flow in this context.

Rossin, Ro, Klein, and Guo (2009) evaluated flow in relationship to learning outcomes for graduate students in an online information management course. They found a relationship between flow and students' perceived learning of the subject matter, skill development, and satisfaction. This suggests that prior knowledge and skill may be relevant to producing flow and greater learning satisfaction.

Zhao, Lu, Wang, and Huang (2011) explored students' Internet use from self-determination, intrinsic motivation (i.e., enjoyment and curiosity), and flow perspectives. Three thousand, four hundred seventy-five junior high and high school students participated ranging in age from 12 to 20 years. They found that teacher support significantly affected curiosity in the perceived autonomy dimension of self-determination, peer influence had a significant influence on enjoyment and curiosity, and internet self-efficacy as a measure related to the competence dimension of self-

determination was positively associated with enjoyment and curiosity. They also found that enjoyment and curiosity may be related to flow state. Additionally, they found that curiosity and flow may be positively related to online exploratory behaviors. These findings suggest that interpersonal support may encourage curiosity and autonomy and that self-efficacy (i.e., perceived competence) may influence curiosity and enjoyment. Understanding the relationship between flow, curiosity, enjoyment, and exploratory behaviors could help students leverage their learning activities.

Burgess and Ice (2011) explored flow in the context of a virtual environment with college level developmental readers. They suggested that enjoyment, positive challenge, personal relevance, sense of loss of time, and control contributed to students' experience of flow in the virtual learning environment. Forte, Gomes, Gondim, and de Almeida (2011) found evidence that 80% of the surveyed population who used Second Life's e-learning environment reported experiencing flow. These findings support the claim that challenge-skill balance, sense of control, relevance, and enjoyment are pertinent factors for achieving flow.

Liu, Cheng, and Huang (2011) examined the effect of simulation games on the learning of computational problem solving in first-year college students. They found that students learning computational problem solving in a simulation game were more likely to experience flow than in a traditional lecture format. They also found that students who frequently reported experiencing flow used trial-and-error, learning-by-example, and analytical reasoning strategies to assimilate computational problem solving skills. Additionally, they found that students who experienced anxiety did not use learning-by-

example as frequently as students in flow and that students who experienced boredom solved the problem at a superficial level. These findings suggest that there may be a relationship between strategy use and flow.

Bressler and Bodzin (2013) examined flow in the context of a mobile-augmented reality science game in students ranging in age from 11 to 15 years. They found that students experienced flow for the activity and that total concentration, challenge-skill balance, and an intrinsically rewarding experience were reported as the most frequently experienced elements of flow, supporting the importance of these theoretically predicted dimensions of flow.

Hou and Li (2014) explored an educational problem-solving adventure game in regard to learning effectiveness, game acceptance, and flow in college students. They found that students with less prior knowledge about the subject matter were able to learn vital information and achieved sufficient acceptance of the game and an adequate flow experience. They also found that challenge level and clear goals were important factors for promoting students' acceptance of the game. These findings suggest that challenge-skill balance, and clear goals may support acceptance (i.e., perceived usefulness and ease of use), and together these elements may support the experience of flow.

Esteban-Millat, Martínez-López, Huertas-García, Meseguer, and Rodríguez-Ardura (2014) examined college students' flow experiences in an online learning environment. They found evidence that students experienced flow during online learning, and that flow experiences contributed to student learning and positive affect (e.g., feeling happy, satisfied, and cheerful). They also found that time distortion,

focused attention, challenge, and personalization were significant factors of flow. These findings suggest that challenge-skill balance, concentration on task, and personalization may lead to flow, and that flow could support positive affect.

Ibáñez, di Serio, Villarán, and Delgado Kloos (2014) investigated flow in the context of an educational technology called Augmented Reality (AR) in 12th grade students. They found that AR may be effective at promoting student learning, and that AR may lead to higher levels of flow experience. They also found that neither the control group nor the intervention group reported being in flow for tasks that were very easy or too difficult. These findings suggest that challenge-skill balance and technological tools could increase the experience of flow and student learning.

Schmierbach, Chung, Wu, and Kim (2014) investigated the effect of game difficulty on competency, flow, and enjoyment on college students in a video game context. They found that competence influenced enjoyment by facilitating the balance between challenge and skill and that competence may be enhanced by an easier game mode. These findings suggest that competence may be built by engaging in skill scaffolding by practicing with less challenging aspects of the task.

Hwang, Chiu, and Chen (2015) investigated inquiry-based learning in an educational computer game context in a sixth-grade social studies course. They found evidence to suggest that an inquiry-based computer game enhanced students' learning achievement, learning motivation, satisfaction, and flow. These findings suggest that inquiry-based learning facilitated by technology may support flow, motivation, achievement, and satisfaction.

Academic content education. For many, flow may not be associated with academics. Compulsory learning activities, examinations, and writing assignments may seem to go against the flow characteristics of sense of control and enjoyment (i.e., intrinsic motivation). Evidence has been presented that supports flow's flexibility in relation to task. It is possible that certain educational methods and modalities may not be conducive to flow. At the same time, there is evidence that students can experience flow when learning in the context of academic activities.

Reed and Schallert (1993) found that understanding and concentration were dimensions of involvement in college academic discourse and that level of involvement varied significantly across the phases of a writing activity. These findings suggest that involvement may vary across academic activities and that comprehension and concentration could encourage engagement in academic discourse.

Beylefeld and Struwig (2007) explored a gaming approach to flow while learning medical microbiology in college students. They found that the game positively impacted students' perceptions and attitudes toward microbiology and contributed to acquisition of general skills. They also found that flow may facilitate heightened team effort and spontaneous communication. These findings suggested that games may be an effective way to structure flow conducive environments and that flow may support collaborative learning activities.

Guo and Ro (2008) found evidence of flow in a college, business education classroom, and the important dimensions of flow were clear feedback, concentration, sense of control, and enjoyment. These findings suggest that unambiguous feedback,

concentration on task, sense of control, and enjoyment may be key factors to support the experience of flow in the classroom.

Cermakova, Moneta, and Spada (2010) investigated dispositional flow as a mediator of the relationship between attentional control and approaches to academic examination preparation in college students. They found that attentional control was positively related to a deep and strategic approach to studying, and negatively related to a surface approach to studying. They also found that flow could partially mediate the relationship between attentional control and approaches to studying. These findings suggest that flow may help students regulate concentration and strategy use while studying for examinations.

Garces-Bacsal, Cohen, and Tan (2011) found clear goals, intense concentration, enjoyment, loss of self-consciousness, and transformation of time among talented visual arts, dance, music, and theater students ranging in age from 14 to 18 years. These findings lend support to the flexibility of flow for multiple contexts. Also, these results suggest some of the relevant flow characteristic (i.e., clear goals, concentration on task, and intrinsic motivation) for generating flow in these contexts.

Abuhamdeh and Csikszentmihalyi (2012) explored the relationship between attentional involvement, challenge-skill balance, competence valuation (i.e., the importance a person places on doing well at a task), and enjoyment in college students. They found evidence to suggest that attentional involvement may fully mediate the relationship between challenge-skill balance and enjoyment, and between competence valuation and enjoyment. These findings suggest that attentional involvement may play

an important role in relationship to challenge-skill balance, competence valuation, and enjoyment. Thus, flow seems to follow similar patterns in academic education as in previous contexts.

Academic procrastination. Procrastination in the context of education on the surface seems to be antithetical to flow. One study found evidence to support this assertion. Lee (2005) investigated the relationship of motivation and flow to academic procrastination in university students. She found that high levels of procrastination were associated with lack of self-determined motivation and low incidence of flow. However, other studies have found results that conflict with the premise that procrastination may inhibit flow.

For example, Seo (2011) explored the relationship between procrastination, flow, and academic achievement in college students. She found no relationship between procrastination and academic achievement. She also found that procrastination increased the likelihood of flow. Kim and Seo (2013) examined the relationship of flow and self-regulated learning to active procrastination in college students. They found that flow and self-regulated learning predicted active procrastination. They also found that active procrastination had a significant effect on academic achievement. However, flow and self-regulated learning better explained academic achievement. These findings suggest that active procrastination may be used by students to add challenge to academic tasks possibly facilitating the experience of flow. Flow has been revealed to be dynamic across diverse contexts. The research has also shown that flow is a nuanced and multidimensional construct.

Review of Research Relevant to Aspects of the Study Design

In this next section, I review the existing literature that influenced me in some of the choices I made in the current study. These four aspects were particularly relevant: the research on sense of control including intervention studies that addressed control, the interventions that attempted to manipulate flow, research focusing on challenge-skill balance, and research related to intrinsic motivation.

Sense of Control

Flow theory suggests, and research has provided support, that autonomy or a sense of control may be an important parameter of flow. Pates, Karageorghis, Fryer, and Maynard (2003) found evidence to suggest that self-selected music may increase college netball players' experience of flow and athletic performance. Fullagar and Mills (2008) investigated motivation and flow in college architecture students. They found that the need for autonomy may moderate the relationship between flow and intrinsic motivation. Mesurado (2010) found evidence that voluntary choice of educational activity had a strong influence on students' experience of flow. Student age ranged from 9 to 15 years. Koehn, Morris, and Watt (2013b) examined flow state in self-paced and externally-paced performance contexts in tennis players ranging in age from 12 to 18 years. They found that flow state may be more predictive of externally-paced performance than self-paced performance. Sense of control may be a significant requirement of flow.

Perhaps, sense of control may be one of the reasons why there are few attempts to create interventions to influence flow in the research literature. Interventions may be perceived as externally structured and controlling, with limited or no opportunities for

participants to have a sense of control. However, research evidence suggests that flow is robust within many contexts and activities. Autonomy seems frequently to be framed within an overarching external contextual structure (i.e., leisure, work or education). Perhaps, a flow intervention that provides the individual with awareness and understanding of challenge-skill balance as a component of flow could encourage the person to take action within the constraints of his or her personal context to create flow. A review of the findings of flow interventions could provide evidence to support the validity of the premise that flow can be manipulated.

Interventions

The research in the area of flow intervention is sparse. The electronic games context has many studies focusing on refining the engagement and enjoyment of the game experience. Typically, evaluations of electronic games for enhancing flow focus on modifying the gaming experience itself. Ma and Williams (2014) investigated designing educational video games to facilitate immersion and flow in fifth to eighth grade students. They found evidence that players experienced flow and immersion during the game. They also found that the game increased students' life science knowledge.

Several flow interventions, focused on modifying individual cognition and behavior, have been conducted in the physical education context. Kaufman, Glass, and Arnkoff (2009) evaluated an intervention focused on mindfulness sport performance enhancement (MSPE) for its effect on dispositional flow, performance, and psychological characteristics of 11 archers and 21 golfers ranging in age from 18 to 76 years. (Kabat-Zinn (1994) defined mindfulness as paying attention on purpose to the present moment

without judgment.) They found levels of flow increased from the first session to the final session. The MSPE intervention could be seen as cognitive and physical training in concentration on task and on the specific dimensions of task performance. Aherne, Moran, and Lonsdale (2011) examined the relationship between mindfulness and flow in college athletes. They found a significant group by time interaction for clear goals, sense of control, and the global flow state score. Pain, Harwood, and Anderson (2011) examined the association of imagery and music intervention in college soccer players' pre-competition routines. The results suggested that the combination of imagery and asynchronous music may facilitate flow and perceived performance. Koehn, Morris, and Watt, (2014) used an imagery intervention (i.e., visualization of aspects of performance) targeting challenge-skill balance, clear goals, concentration on task, and sense of control to enhance flow state and competition performance in tennis players ranging in age from 13 to 15 years. They found that three out of four of the participants demonstrated an increase in flow, and all participants improved in service performance, groundstroke performance, and rank-listing position. These findings suggest that flow may be open to experimental manipulation. Expansion of research exploration in the area of flow intervention is one of the primary objectives of this research.

Challenge-skill Balance

Research suggests that challenge-skill balance may be an important antecedent of flow. Challenge-skill balance is theorized to occur when the challenge of the task is closely matched by the individual's present skill level. In a meta-analysis of the flow

literature, Fong, Zaleski, and Leach (2014) found a moderate relationship between challenge-skill balance and flow.

To manipulate personal challenge-skill balance, an individual needs to understand what challenge-skill balance is and how to influence it. Challenge-skill balancing could be interpreted as a cognitive process in which the individual assesses the activity and strives to balance the challenge of the activity with his or her skill level. For example, if the challenge of the present activity is far outside the individual's present skill level, he or she will probably experience anxiety when engaged in this activity. Challenge-skill balancing is required to adjust the challenge of the activity to a level just above present skill level, perhaps by breaking it into smaller, more manageable pieces. Conversely, if the challenge of the activity is below the individual's skill level, he or she is more likely to experience boredom unless some complexity is added to the activity to make it more challenging. The objective of challenge-skill balancing is to actively structure a closer match between the challenge of the activity and the skill level of the participant.

Because challenge-skill balancing requires assessing the challenge of the activity, task analysis is a necessary subset skill of the challenge-skill balancing process. Task analysis entails understanding the different levels of complexity of an activity. The terms *easy* and *difficult* are typically used to refer to the overall challenge of an activity. Task challenge is a function of task complexity. Thus, learning how to analyze and assess the complexity of a task is helpful in reaching for challenge-skill balancing. A better understanding of the complexity of a task also facilitates a more accurate challenge assessment of the activity.

Weinstein's Model of Strategic Learning (Weinstein, Tomberlin, Julie & Kim, 2004) addresses task analysis in its conceptualization of the requirements of the current learning activity, assignment, or test. By developing the skill of understanding the requirements of the current learning activity, assignment, or test, learners are empowered to approach the task more strategically by helping them to reflect on the specific parameters of the task (e.g., format, page length, time constrains, etc.).

Individuals capable of actively conducting challenge-skill balancing activities, such as task analysis, are more likely to be able to assess the specific performance requirements of the activity. Task analysis can enable effective goal setting by facilitating a clear understanding of what is necessary to engage the activity. Also, task analysis could encourage unambiguous feedback by facilitating the parsing of subtasks into clearer metrics and markers of performance to utilize during their performance.

Haworth and Evans (1995) explored the relationship between challenge-skill balance and positive subjective states (i.e., enjoyment, interest, happiness, and relaxation) in the daily life of students ranging in age from 16 to 19 years. They found a relationship between mean levels of challenge and mean levels of enjoyment and interest. They also found that enjoyment, happiness, and relaxation were experienced in situations of low challenge where participants had more skill.

Moneta and Csikszentmihalyi (1996) examined challenge-skill balance in relation to dimensions of experience (i.e., concentration, wish to do the activity, involvement, and happiness) and context (i.e., in school, with relatives, with friends, and in solitude) in daily life of students ranging in age from 14 to 17 years. They found that perceived

levels of challenge and skill may be positively associated with concentration and involvement. They also found that in general, school and solitude contexts yielded lower values for dimensions of experience and being with relatives and friends had higher values for dimensions of experience.

Moneta and Csikszentmihalyi (1999) investigated challenge-skill balance in relation to concentration in everyday life of students ranging in age from 14 to 17 years. They found that the challenge-skill balance model of flow was robust to different parameterizations of the balance term. They also suggested that the balance effect should be interpreted flexibly and that challenge-skill balance may be more actually represented as a ratio of approximately 1.6 for challenge of the task over skill. Additionally, they found that lack of challenge may be more detrimental to concentration than lack of skill.

Engeser and Rheinberg (2008) examined flow, performance, and moderators of challenge-skill balance in college students ranging in age from 18 to 54 years. They found evidence to suggest that flow may be dependent on skill and marginally dependent on difficulty, but flow may not be influenced by the interaction of skill and difficulty. They also found that the relationship between challenge-skill balance and flow may be moderated by perceived importance of the task and achievement motive (i.e., hope of success and fear of failure). Additionally, they found that in two of the three studies, flow predicted performance.

In a critique of challenge-skill balance, Løvoll and Vittersø (2014) evaluated challenge and skill matching with college students in outdoor sporting contexts (i.e., a coastal trip, a three-day ski trip, and a five-day glacier course). They found that a balance

of challenge and skill may not be conducive to flow. They suggested that in high skill situations a challenge-skill imbalance may be more closely associated with flow and that situations in which challenge and skill are exactly matched may produce boredom and disinterest. These findings suggest that challenge-skill balance is a dynamic construct but that it seems to influence the experience of flow.

Intrinsic motivation

According to Csikszentmihalyi's (1975, 1990) flow theory, experiences of flow can increase intrinsic motivation toward a specific activity. The intrinsic motivation generated by flow is activity-focused motivation, not outcome-focused motivation (Eccles & Wigfield, 2002; Robinson & Tamir, 2011). Intrinsically motivating experiences encourage involvement and active participation (Csikszentmihalyi, 1975). Interest motivates students to learn in such a way as to support their curiosity, acting as a bridge to more complex activities (Shernoff et al., 2003). Several studies have found flow to be linked to intrinsic motivation.

Waterman, Schwartz, Goldbacher, Green, Miller, and Philip (2003) investigated intrinsic motivation in relationship to self-determination, challenge-skill balance, and self-realization values in college students. They found that balance of challenge and skills and self-realization values were associated with intrinsic motivation, as was flow.

Cerasoli, Nicklin, and Ford (2014) performed a meta-analysis on how intrinsic motivation and extrinsic incentives influence performance, drawing from school, work, and physical domains. They found that intrinsic motivation had a moderate to strong impact on performance and that intrinsic motivation still influenced performance when

incentives are present. They also found that intrinsic motivation may be less important to performance when incentives are directly rather than indirectly associated with performance. Additionally, intrinsic motivation seemed associated with quality of performance and incentive with quantity of performance.

Intrinsic motivation (i.e., enjoyment and interest) may be an important factor for a flow intervention, through its connection to helping the individual focus on the intrinsic value and/or utility value of the activity.

Intrinsic value. Intrinsic value can be defined as the interest or enjoyment that a person has for engaging in an activity (Eccles 2007; Wigfield, Tonks & Klauda 2009).

Joo, Lim, and Kim (2012) investigated flow and achievement in a corporate e-learning context. Participant age ranged from 23 to 58 years. They found that self-efficacy, intrinsic value, perceived usefulness, and ease of use influenced flow, and acted as predictors of achievement. Additionally, they found that perceived usefulness and ease of use were the most impactful factors for flow and achievement.

Task significance (i.e., meaningfulness of the work) was found to be associated with challenge-skill balance, concentration on task, sense of control, and autotelic experience (Maeran & Cangiano, 2013). Several studies have found that importance and meaning may be associated with intrinsic motivation and flow. Relevance has also been found to be related to intrinsic motivation and flow.

Utility value. Utility value is defined as the perceived importance of a task associated with its usefulness or relevance for other tasks or to the individual's life (Hulleman, 2007; Hulleman, Durik, Schweigert & Harackiewicz, 2008; Hulleman,

Godes, Hendricks & Harackiewicz, 2010). Utility value could be useful in stimulating intrinsic motivation (i.e., interest and enjoyment) in an activity by encouraging the student to reflect on the task's usefulness and relevance. Hulleman (2007) demonstrated that helping college students see the value in their academic activities increased their perceptions of utility value and interest. Hulleman, Godes, Hendricks, and Harackiewicz (2010) found that perceived utility value, experimentally defined as manipulated relevance, influenced interest and predicted performance in college students. However, Durik, Shechter, Noh, Rozek, and Harackiewicz (2015) found evidence to suggest that success expectancies may moderate the effect of directly-communicated utility value in adolescent students. Including utility value as part of the intervention could be useful in generating interest in the activity to ameliorate apathy, if present, and encourage engagement.

Schweinle, Meyer, and Turner (2006) explored the relationship between motivation and affect for fifth and sixth grade mathematics students. They found that challenge was perceived as a threat to self-efficacy and that perceived importance of an activity may be more related to motivation than to challenge. Nicic, Nørby, Johansen, and Willaing (2014) found evidence to suggest that perceived relevance, new knowledge acquisition, and the feeling of importance in relation to one's life were associated with engagement and flow in group-based, older adult patient education for Type II diabetes. Simons, Dewitte, and Lens (2004) examined the role of different types of instrumentality in relation to motivation, study strategies, and performance in first-year nursing students ranging in age from 18 to 45 years. They found that being internally regulated and

perceiving the utility of the courses influenced adaptive goal orientation and intrinsic motivation, which then were related to adaptive cognitive strategies and study habits, and ultimately predicted performance. These findings suggest that intrinsic value and utility value are associated with intrinsic motivation.

Summary

The theoretical conceptualization of flow and its underlying characteristics have been presented along with the conceptual constructs targeted for intervention (i.e., challenge-skill balancing and intrinsic motivation) in the context of academic writing at the college level. My goal in reviewing the literature was to provide support for the development of an intervention structured to prime and scaffold challenge-skill balancing and intrinsic motivation (i.e., interest and enjoyment) in an academic writing context to facilitate flow.

The primary objective of this study was to test whether flow can be influenced by a direct intervention focusing on challenge-skill balancing and intrinsic motivation. The intervention's effect was evaluated on challenge-skill balance, concentration on task, flow, and intrinsic motivation.

Chapter 3

Method

My objective for this study was to examine the influence of a flow intervention on students' experience of flow while engaging in academic writing. As discussed in the literature review, researchers have reported evidence that challenge-skill balancing may be a useful skill to develop to facilitate flow states. Drawing on flow theory and previous research, a flow intervention was designed to help students learn about challenge-skill balance and how to structure it for academic writing activities. An intrinsic motivation component was added to help students understand the value that the academic writing activity represented to them and to help them address, if present, feelings of apathy toward academic writing activities. Concentration on task and the flow composite score were chosen as outcome variables to assess the intervention's impact on flow state. This study is designed to explore the following research questions and associated hypotheses.

Research Questions and Hypotheses

Described below are my four research questions and associated hypotheses.

Research question 1. Did the flow intervention impact students' challenge-skill balance?

Hypothesis 1. On average, the flow intervention group was hypothesized to have a higher mean post-test challenge-skill balance score compared to the control group, and to show a significant change in scores from pre-test to post-test.

Rationale. Flow theory postulates that challenge-skill balancing is a meta-skill that can be enhanced with practice (Csikszentmihalyi, 1975, 1990). The intervention

presented direct instruction on challenge-skill balancing. This hypothesis assessed if the direct instruction on challenge-skill balancing influenced students' use of challenge-skill balancing during subsequent academic writing activities. If the groups' mean challenge-skill balance scores differ at post-test, it will provide supporting evidence that the flow intervention may have influenced challenge-skill balance for the academic writing activity.

Research question 2. Did the flow intervention influence participants' experience of concentration on task?

Hypothesis 2. On average, the flow intervention group was hypothesized to have a higher mean post-test concentration on task score compared to the control group, and to show a significant increase from pre-test to post-test.

Rationale. The flow intervention focused primarily on challenge-skill balance and intrinsic motivation. This hypothesis evaluated the impact of the flow intervention on a key factor of flow, concentration on task, on subsequent academic writing activities. If the groups' mean concentration on task scores differs at post-test, it will provide supporting evidence that the flow intervention may have influenced concentration on task for the academic writing activity. Also, the hypothesis was directed at finding a significant increase from pre-test to post-test for the intervention.

Research question 3. Did the flow intervention impact participants' experience of flow state?

Hypothesis 3. On average, the flow intervention group was hypothesized to have a higher mean post-test flow composite score compared to the control group, and a higher post-test than pre-test score.

Rationale. The flow intervention was focused primarily on challenge-skill balance and intrinsic motivation. This hypothesis evaluated the impact of the flow intervention on a general measure of the flow state, the flow composite score, during subsequent academic writing activities.

Research question 4. Did the flow intervention impact intrinsic motivation?

Hypothesis 4. On average, the flow intervention group was hypothesized to have a higher mean post-test intrinsic motivation score than pre-test score, and a higher post-test score compared to the control group.

Rationale. The flow intervention was designed to fostered reflection regarding personal interest and enjoyment. This hypothesis assessed if the flow intervention influenced students' intrinsic motivation during subsequent academic writing activities.

These research questions and hypotheses provided guidance in testing the efficacy of the intervention. The subsequent sections will operationally define the experimental parameters and procedures.

Participants

The participants were 213 undergraduate students enrolled in a large southwestern public university. Two students were not included in the final dataset, one because she had participated in the pilot study, and another because he did not complete all instruments. Of the remaining 211 students, the control group (n=104) consisted of 41

male students and 63 female students. The intervention group (n=107) was made up of 35 male students and 72 female students. The research subjects represented an age range of 18 - 24 years old. The control group had a mean age of 21, and the intervention group's mean age was 20.9. Both control and intervention groups represented a diverse group of ethnicities.

Table 1. Ethnicity by group

Ethnic Identification	Control	Intervention
Asian	24	25
African American	3	6
Caucasian	45	58
Latino	28	15
Other	4	3

Academic classification was another demographic variable collected at the beginning of the study. The control group was made up of one first year student, six sophomores, 21 juniors, and 76 seniors. The intervention group had one first year student, six sophomores, 38 juniors, and 62 seniors.

Sampling Procedures

The participants for the study were drawn from a research subject pool. The pool was obtained from students volunteering to participate as fulfillment of a course requirement. If they did not choose to participate in the research pool, students had the opportunity to complete an alternative assignment.

Students signed up for experimental sessions, not knowing whether it was a control group or intervention group session. Any student enrolled in an individual

learning skills course that had some curricular content focused on self-motivation was excluded from the sample.

Sample Size, Power, and Precision

G*Power was used to generate an estimate of the sample size. The power parameter was set to .8 and alpha at .05 with a small effect size (.1). The F test was selected due to the use of repeated measures two-way ANOVA as the statistical method. Given these parameters, G*Power calculated that a sample of 200 participants would be required to adequately test the statistical hypotheses. A sample size of 211 participants was obtained for this study, suggesting adequate power to test the hypotheses.

Measures

The Flow State Scale (FSS-2) General assessment was used to measure flow variables (see Appendix A). The scale has 36 Likert scale items and is made up of nine subscales. The scales that were used to analyze the research hypotheses were challenge-skill balance ($\alpha = .76$) (e.g., I was challenged, but I believed my skills would allow me to meet the challenge), concentration on task, ($\alpha = .87$) (e.g., My attention was focused entirely on what I was doing), and the flow composite score, a sum of the nine flow subscales (Jackson, Eklund, & Martin, 2010).

The Intrinsic Motivation Inventory (IMI) was used to measure intrinsic motivation (see Appendix A). It has 7 Likert scale items measuring interest/enjoyment ($\alpha = .78$) (e.g., I enjoy doing this activity very much) (McAuley & Duncan, 1989; Ryan, Mims, & Koestner, 1983).

Research Design

Approximately eight sessions per week for a total of 40 sessions were made available to participants spanning from late September until late October. Sessions were distributed across time slots and days of the week. Participants chose the session that they would attend. Session sizes ranged from one to 10 students. All sessions were approximately 90 minutes in duration, facilitated by me, and held in a computer lab.

Upon arrival, participants were asked to read and sign the study consent form. Once consent had been given, participants were given a slip of paper with a web address on it and instructed to select a computer from 10 computers in the middle of the room. They were told to log on to the computer, open a browser, and type in the web address. They were instructed to answer several questions (e.g., identification and demographic questions) and stop at the welcome page. Participants who arrived after the session had begun were asked to sign up for a subsequent session.

The sessions started with a welcome and an invitation to respond to the questions as thoughtfully and honestly as possible. They were assured that their responses would be kept confidential, and they were asked not to work ahead. Participants were asked if they had any questions, and if questions were asked, I answered them before proceeding.

All sessions started with a writing activity (see Appendix B). The participants were given one of two writing assignments (randomly assigned). Approximately half the participants received the "know how" writing activity, and the other received the "competence" writing activity. Students were given 10 minutes to complete the writing activity.

After completing the writing activity, participants were asked to complete the Flow Situational Scale (FSS-2) (Jackson, Eklund, & Martin, 2010) and the Intrinsic Motivation Inventory (IMI) (Ryan, Mims, & Koestner, 1983) (see Appendix A).

Following the writing activity and assessments, the intervention group was given direct instruction on challenge-skill balancing and intrinsic motivation (see Appendix C). They were asked to provide instruction engagement-related information. For example, they were asked to reflect on previous experiences of enjoyment and interest during academic writing activities. These questions were designed to prime them to their prior knowledge of enjoyment, interest, and challenge-skill balancing and to facilitate engagement with the instructional content of the intervention.

Following the writing activity and assessments, the control group was given direct instruction on university history. They were asked to provide instruction engagement-related information. For example, they were asked to reflect on their knowledge of university history and their knowledge of various traditions. These questions were designed to prime them to their prior knowledge of university history and their knowledge of various traditions.

Next, the participants were asked to engage in another academic writing activity. Those participants who had completed the "know how" writing activity at the beginning of the session now received the "competence" writing activity for the second writing task, and vice versa. Upon completion of the second writing activity, participants took the Flow Situational Scale (FSS-2) and the Intrinsic Motivation Inventory (IMI). The

aforementioned activities constituted the entirety of the intervention and control group sessions.

Data Analysis

Upon completion of the data collection cycle, preliminary data inspection was conducted as well as tests of reliability. The data were organized into a de-identified dataset for hypothesis testing using repeated measures two-way ANOVAs.

Chapter 4

Results

Preliminary Analyses

Descriptive statistics were generated to ascertain missing data, reasonability of individual cases, and characteristics of the data set. The preliminary analysis provided information regarding reliability of the measures, assessment of outliers, assessment of impact of study session, possible violations of statistical assumptions, and appropriateness of the primary analyses. All statistical analyses were calculated using SPSS version 21 software (IBM, 2012).

Reliability Analyses

Reliability was evaluated for each of the self-report measures, challenge-skill balance, concentration on task, flow composite score, and intrinsic motivation. Cronbach's alpha coefficients (α) were calculated to assess the internal consistency of the items at pre-test and post-test (see Table 2). The internal consistency was adequate for each scale (α was greater than .7 for all of the measures) for both pre-test and post-test.

Table 2. Reliability of the self-report measures at pre-test and post-test.

	# of items	Possible Range	Pre α	Post α
Challenge-Skill Balance	4	1-7	0.74	0.73
Concentration on Task	4	1-7	0.89	0.92
Flow Composite Score	36	9-63	0.92	0.93
Intrinsic Motivation	7	1-7	0.90	0.92

Note. N=211. Cronbach's alpha coefficient (α) is a measure of internal consistency reliability.

Descriptive Statistics

Means and standard deviations for each of the self-report measures for pre-test and post-test are summarized in Table 3. Scores on the challenge-skill balance scale, concentration on task scale, flow composite scale, and intrinsic motivation scale were evaluated for skew. No significant skew was observed for the scales in this sample.

Table 3. Descriptive statistics for the self-report measures at pre-test and post-test.

	Pre				Post			
	Control		Intervention		Control		Intervention	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Challenge-Skill Balance	4.95	.86	4.84	1.10	4.99	.86	5.18	.93
Concentration on Task	5.06	1.24	4.68	1.46	5.12	1.34	4.90	1.36
Flow Composite Score	42.48	6.34	41.20	7.29	43.56	6.47	44.11	7.13
Intrinsic Motivation	3.19	1.10	2.99	1.17	3.45	1.15	3.5	1.23

Note. Control group (n=104) and intervention group (n=107).

Bivariate Correlations

The bivariate correlations of the self-report measures are summarized in Table 4. Several of the scales displayed positive and significant correlations due to parallels in construct conceptualization. For example, clear goals (CG) and unambiguous feedback (UF) were correlated at the .73 level. Clear goals questions probe for students' clarity of what to do, and unambiguous feedback questions ask if they know how well they are doing in relation to the task. Not surprisingly, the flow composite score (FCS) was highly correlated with all of the scales because it is a composite of all of the scales.

Table 4. Correlations between self-report measures.

	PreMAA	PreCG	PreUF	PreCT	PreSC	PreLSC	PreTT	PreAE	PreFCS
PreCSB	.47**	.56**	.50**	.34**	.59**	.14*	.00	.45**	.67**
PreMAA		.54**	.51**	.21**	.42**	.21**	-.02	.36**	.63**
PreCG			.73**	.46**	.61**	.25**	.08	.47**	.80**
PreUF				.42**	.62**	.27**	.04	.39**	.77**
PreCT					.61**	.37**	.00	.36**	.67**
PreSC						.35**	-.05	.35**	.76**
PreLSC							-.03	.20**	.52**
PreTT								.31**	.24**
PreAE									.68**

Note. * $p < .05$, 2-tailed. ** $p < .01$, 2-tailed. PreCSB = pre-test challenge-skill balance; PreMAA = pre-test merging of action and awareness; PreCG = pre-test clear goals; PreUF = pre-test unambiguous feedback; PreCT = pre-test concentration on task; PreSC = Pre-test sense of control; PreLSC = pre-test loss of self-consciousness; PreTT = pre-test transformation of time; PreAE = pre-test autotelic experience.

Examination of Assumptions

The main statistical analysis for this study was the repeated measures analysis of variance (ANOVA). Repeated measures ANOVA has several assumptions that need to be evaluated to confirm the appropriateness of the statistical procedure. When containing a between factor, the repeated measures ANOVA has the assumptions of independence of observations, normality, and homogeneity of variance. The repeated measures ANOVA within factor has the additional assumption of sphericity. However, as the current design has only two points for the within factor, the sphericity assumption is relaxed. The

statistical assumptions of independence of observations, normality, and homogeneity of variance were evaluated for this dataset.

The independence of observations assumption was addressed by the experimental design parameters. The participants were randomly assigned to groups. They completed the study at their own individual computer terminal, and there was a 60-minute period between the pre-test and the post-test.

Repeated measures ANOVA has been found to be robust to violations of normality (Stevens, 2002). However, the frequency distribution and skew of the dependent variables were evaluated, when all of the variables were within acceptable parameters.

Homogeneity of covariance matrices was evaluated for the sample (see Table 5). Challenge-skill balance was significant. However, the repeated measures ANOVA has also been found to be robust to violations of homogeneity of covariance matrices when group sizes are relatively similar (Stevens, 2002), as was true in this study with the control group at 104 and the intervention group at 107 students.

Table 5. Box's Test of homogeneity of covariance matrices.

Challenge-Skill Balance	.038*
Concentration of Task	.125
Flow Composite Score	.327
Intrinsic Motivation	.49

Note. * $p < .05$.

Preliminary Exploratory Analyses

Before conducting the primary analyses, an evaluation to see if there was a session group effect was in order. Participants attended the study in 40 groups of 10 people or fewer. There were 20 sessions for the control group and 20 sessions for the intervention group. One-way ANOVA was used to evaluate the effect of session group on each of the dependent variables at pre-test (see Table 6) and post-test (see Table 7) for the 20 sessions within each group. Analyses found no significant session grouping effect, suggesting that a multi-level model was not necessary. The session effect was not included in subsequent analyses.

Table 6. Pre-test session group effect results within control group and intervention group.

	Pre	
	Control	Intervention
Challenge-Skill Balance	F (19, 84) = .74, p = .77	F (19, 87) = 1.077, p = .39
Concentration on Task	F (19, 84) = .961, p = .51	F (19, 87) = .647, p = .86
Flow Composite Score	F (19, 84) = .868, p = .62	F (19, 87) = .737, p = .77
Intrinsic Motivation	F (19, 84) = .668, p = .84	F (19, 87) = .706, p = .80

Note . Control group (n=20) and intervention group (n=20).

Table 7. Post-test session group effect results within control group and intervention group.

	Post	
	Control	Intervention
Challenge-Skill Balance	F (19, 84) = 1.685, p = .06	F (19, 87) = .537, p = .94
Concentration on Task	F (19, 84) = 1.058, p = .41	F (19, 87) = .398, p = .99
Flow Composite Score	F (19, 84) = 1.201, p = .28	F (19, 87) = .359, p = .99
Intrinsic Motivation	F (19, 84) = .741, p = .77	F (19, 87) = .482, p = .96

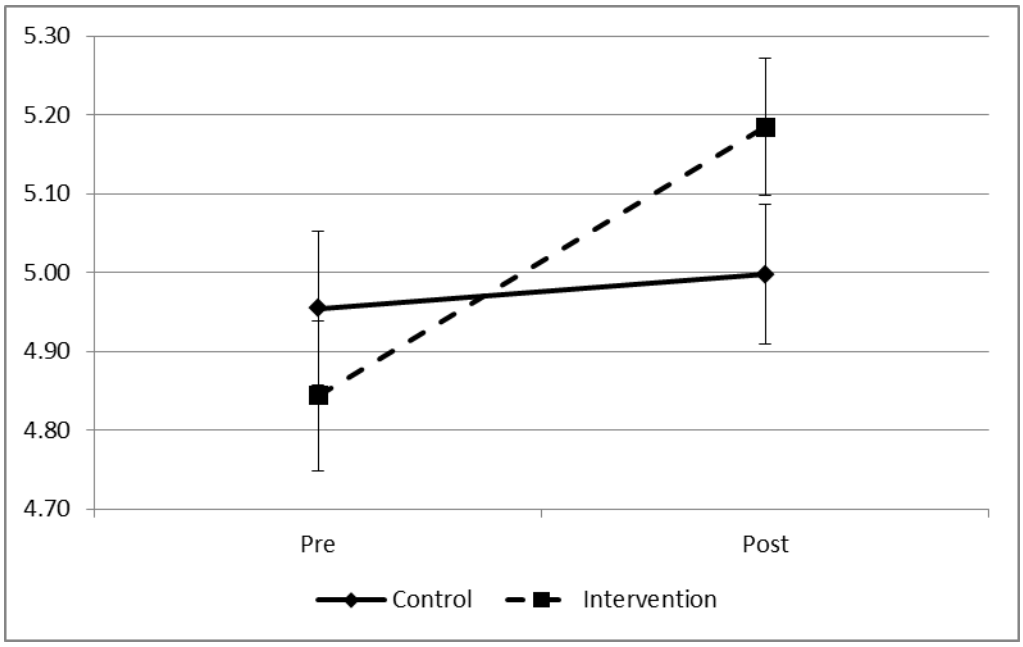
Note . Control group (n=20) and intervention group (n=20).

Primary Analyses

The data for challenge-skill balance, concentration on task, flow composite score, and intrinsic motivation were analyzed using a 2 group (control group and intervention group) x 2 time (pre-test and post-test) repeated measures ANOVA. Box plot analyses were conducted to identify outliers. Repeated measures ANOVA analyses were performed including and excluding outliers. Removal of outliers did not significantly change study findings. The results presented below include the data of all 211 participants. Group means and standard deviations for each dependent variable are presented in Table 2. An alpha level of .01 was used to evaluate the results, to address the possible inflation of Type I error created by conducting multiple univariate analyses (Stevens, 2002).

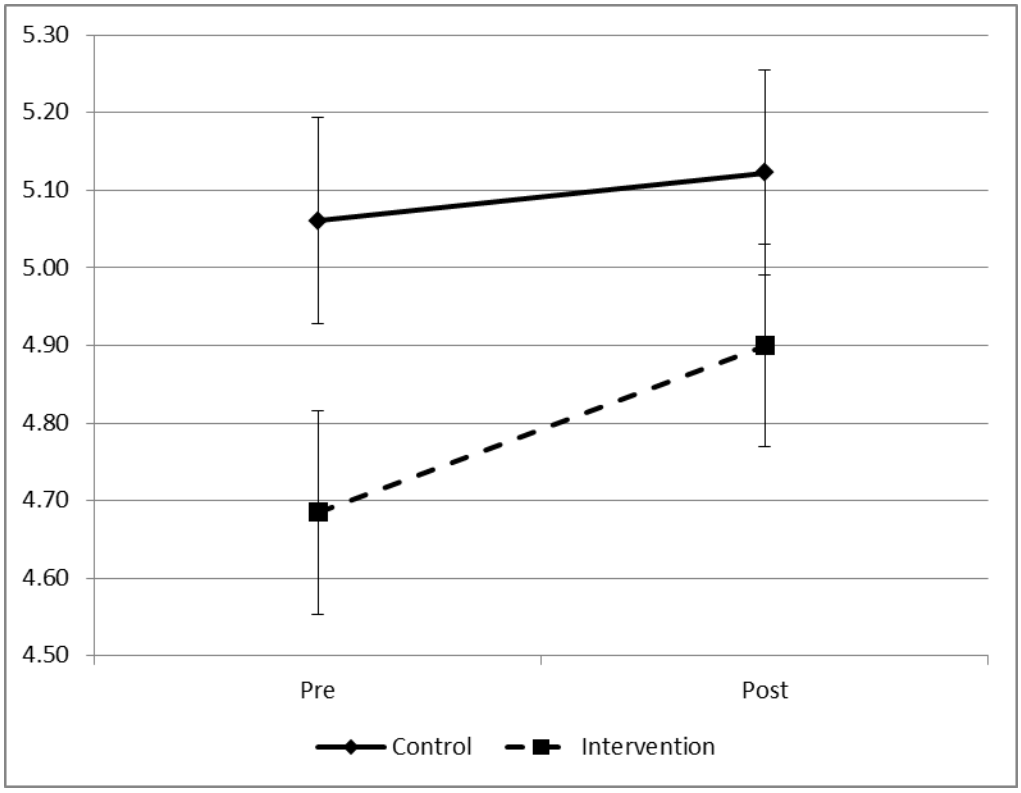
Challenge-skill balance. Repeated measures ANOVA results for challenge-skill balance yielded no main effect for group, $F(1,209) = .113$, $p = .737$ (see Figure 1). There was a significant main effect of time from pre-test to post-test, $F(1,209) = 8.846$, $p = .003$. The interaction between group and time was not significant, $F(1,209) = 5.312$, $p = .022$. Pairwise comparisons showed that there were no significant differences at pre-test ($p = .417$) or post-test ($p = .133$). Although the intervention group evidenced a statistically significant change from pre-test to post-test ($p = .000$) for challenge-skill balance, the control group did not.

Figure 1. Group by time interaction on Challenge-Skill Balance (CSB).



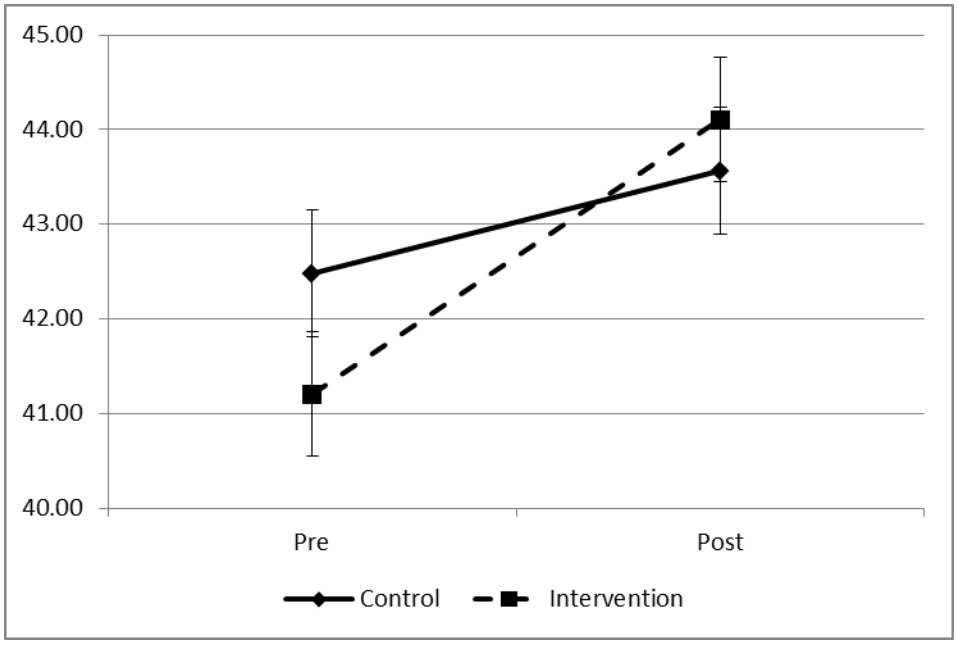
Concentration on task. Repeated measures ANOVA results for concentration on task evidenced no main effect for group, F (1,209) = 3.25, p = .073 (see Figure 2). The results suggested no significant main effect of time from pre-test to post-test, F (1,209) = 2.71, p = .101, and no interaction between group and time, F (1,209) = .82, p = .367. Pairwise comparisons showed that there were no significant differences at pre-test (p = .045) or post-test (p = .231). Neither the control group (p = .603) nor the intervention group (p = .071) demonstrated a significant change from pre-test to post-test for concentration on task.

Figure 2. Group by time interaction on Concentration on Task (CT).



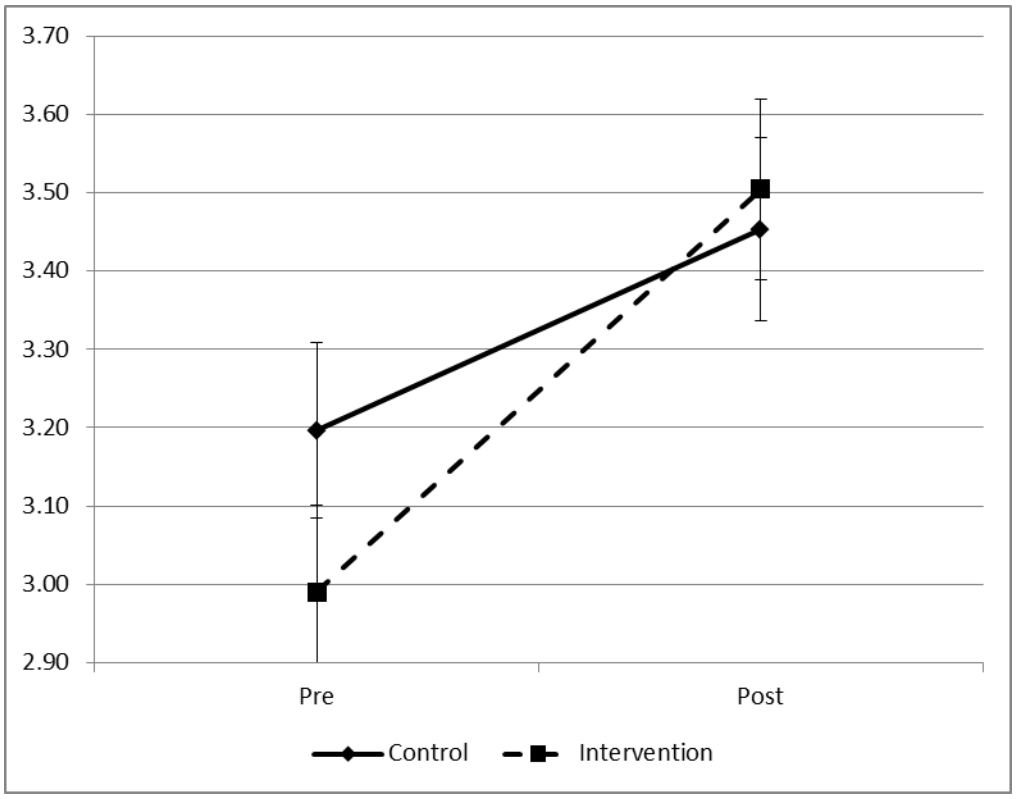
Flow composite score. Repeated measures ANOVA results for the flow composite score presented no main effect for group, F (1,209) = .19, p = .665 (see Figure 3). There was a significant main effect of time from pre-test to post-test, F (1,209) = 22.54, p = .000. The interaction between group and time was not significant, F (1,209) = 4.67, p = .032. Pairwise comparisons demonstrated that there were no significant differences at pre-test (p = .178) or post-test (p = .564). The control group did not show a significant change from pre-test to post-test (p = .071), but the intervention group did show a statistically significant increase from pre-test to post-test (p = .000) for the flow composite score.

Figure 3. Group by time interaction on Flow Composite Score (FCS).



Intrinsic motivation. Repeated measures ANOVA results for intrinsic motivation showed no main effect for group, F (1,209) = .27, p = .602 (see Figure 4). There was a significant main effect of time from pre-test to post-test, F (1,209) = 37.32, p = .000, but the interaction between group and time was not significant, F (1,209) = 4.15, p = .043. Pairwise comparisons evidenced that there were no significant differences at pre-test (p = .191) or post-test (p = .755). The control group (p = .005) and the intervention group (p = .000) demonstrated a significant change from pre-test to post-test for intrinsic motivation.

Figure 4. Group by time interaction on Intrinsic Motivation (IM).



Chapter 5

Discussion

The purpose of this study was to test whether college students would be affected by an intervention that emphasized aspects of flow and of intrinsic motivation. Because a study of flow is necessarily associated with a particular activity, I chose to situate the flow intervention in an academic writing activity. Thus, the flow intervention was hypothesized to impact students' challenge-skill balance, concentration on task, flow composite score, and intrinsic motivation. There was no support for the prediction that there would be differences between the control and intervention group means. In the section below, I begin by discussing each set of results, before moving to limitations of the study, and future research suggestions.

Challenge-Skill Balance

Research question one asked if the flow intervention impacted challenge-skill balance. On average, the flow intervention group was hypothesized to have a higher mean post-test challenge-skill balance score compared to the control group, and to show a significant change in scores from pre-test to post-test. The results did not support this hypothesis. Instead, there was no significant difference between group means. The pairwise comparison post-hoc decomposition confirmed no significant difference between group means at pre-test and at post-test. The results suggested that there was a significantly different change between the groups from pre-test to post-test in challenge-skill balance. However, the group by time interaction statistic approached significance at the .022, but did not meet the .01 alpha set for this study. The pairwise comparison post-

hoc decomposition demonstrated a significant difference from pre-test to post-test for the intervention group (p = .000). These findings supported retaining the null hypothesis. This study did not find support for research question one.

From an exploratory research perspective, the group by time interaction approaching significance and the significant pre-test to post-test change within the intervention group may provide evidence that the intervention may be having some influence on challenge-skill balance and that further refinements are necessary to enhance the efficacy of the intervention.

Instruction regarding challenge-skill balancing was a central component of the intervention. Exploring alternative instructional approaches may be necessary to scaffold assimilation, comprehension, and application of the idea of challenge-skill balancing by students. For example, customization of challenge-skill balance requires integration of a complex set of abstract concepts such as task analysis, skill assessment, and challenge-skill balancing strategies. An alternative method could facilitate the processing and use of challenge-skill balancing.

Also, the intervention was approximately only 60 minutes in duration to discuss challenge-skill balancing and intrinsic motivation. The duration of the intervention may need to be extended to provide additional time to address challenge-skill balance, task analysis, challenge-skill balancing strategies adequately, and to allow more opportunities for students to practice applying challenge-skill balancing in an academic writing context.

Additionally, after field-testing several writing prompts, these writing activities were selected because of their average-challenge student ratings. As Moneta and

Csikszentmihalyi (1999) suggested, the challenge of the writing activities may need to be increased to be above medium in order to foster a more conducive challenge-skill balancing environment.

The hypothesis for challenge-skill balance was not supported by this study. However, some evidence was found that may point to opportunities to make adjustments to the intervention and study elements using flow theory and the research literature to enhance the efficacy of subsequent research.

Concentration on Task

Research question two asked if the flow intervention influenced participants' experience of concentration on task. On average, the flow intervention group was hypothesized to have a higher mean post-test concentration on task score compared to the control group, and to show a significant increase from pre-test to post-test. The results for concentration on task demonstrated no significant difference between group means and no main effect of time. The pairwise comparisons post-hoc decomposition added support for no significant findings. These findings supported retaining the null hypothesis. This study did not find support for research question two.

The pre-test group mean difference approached significance at an alpha of .045. This may suggest some initial difference between the groups that may have influenced the findings. Also, the short duration of the writing activity, approximately 10 minutes, may not have given adequate time for concentration on task to be a salient variable for the students.

Finally, concentration on task was not directly discussed in the intervention. Concentration on task was selected because of its prevalence in the flow literature and specifically its association with challenge-skill balance. Abuhamdeh and Csikszentmihalyi (2012) and Moneta and Csikszentmihalyi (1999) have found that concentration is positively associated with challenge and skill. The hypothesis for concentration on task was not supported by this study.

Flow Composite Score

Research question three asked if the flow intervention impacted participants' experience of flow state. On average, the flow intervention group was hypothesized to have a higher mean post-test flow composite score compared to the control group, and a higher post-test than pre-test score. The results did not support this hypothesis, as there was no significant difference between group means. However, the results hinted at a change between the groups from pre-test to post-test in the flow composite score, as the group by time interaction statistic approached significance at $p = .032$, but did not meet the .01 alpha level set for this study. In an exploratory analysis, the pairwise comparison post-hoc decomposition demonstrated a significant difference from pre-test to post-test for the intervention group ($p = .000$). However, overall, these findings supported retaining the null hypothesis.

From an exploratory research perspective, the group by time interaction approaching significance and the significant pre-test to post-test change within the intervention group may provide supporting evidence that the intervention is having some influence on flow and that refining the intervention may enhance its efficacy.

Also, the flow score is a composite of all nine flow subscales: challenge-skill balance, clear goals, unambiguous feedback, concentration on task, sense of control, merging of action and awareness, loss of self-consciousness, transformation of time, and autotelic experience. The short duration of the writing activities could conceivably be impacting the salience of concentration on task and transformation of time. For instance, transformation of time was the one flow variable that had non-significant results across all parameters analyzed: main effects, interaction effect, and post-hoc pairwise comparisons. This may suggest that the writing activities did not last long enough to allow for a transformation of time or the short duration may have created challenges in accurately perceiving the phenomenon. Also, flow was not directly discussed in the intervention. Challenge-skill balance and interest and enjoyment (i.e., intrinsic motivation) were the focal points of the intervention discussion. This may suggest the need for a revised and more powerful intervention.

Additionally, sense of control may have been an issue. An open response and open discussion format was selected for the instructional sessions to encourage and support a sense of control. Deci and Ryan (1987) proposed that personal ownership and responsibility may facilitate integrated functioning, and Mesurado (2010) found evidence that voluntary choice of educational activity had a strong influence on students' experience of flow. Sense of control also demonstrated non-significant results across all of the parameters analyzed. An alternative approach may be necessary to create an autonomy-supportive environment to foster students' sense of control.

The hypothesis for flow was not supported by this study. However, some evidence was found that may point to opportunities to make adjustments to the intervention and study elements using flow theory and the research literature to enhance the efficacy of subsequent research.

Intrinsic Motivation

Research question four asked if the flow intervention impacted intrinsic motivation. On average, the flow intervention group was hypothesized to have a higher mean post-test intrinsic motivation score than their pre-test score, and a higher post-test score compared to the control group. The results did not support this hypothesis. The pairwise comparison post-hoc decomposition confirmed no significant difference between group means at pre-test and at post-test. However, the group by time interaction statistic approached significance at the .043, but did not meet the .01 alpha set for this study. The pairwise comparison post-hoc decomposition demonstrated a significant difference from pre-test to post-test for the intervention group (p = .000), but also for the control group (p = .005). These findings supported retaining the null hypothesis.

From an exploratory research perspective, the group by time interaction approaching significance and the significant pre-test to post-test change within the intervention and control group may provide evidence that the intervention and the control curriculum are influencing intrinsic motivation and that changes are necessary to enhance the efficacy of the intervention and change the control group curriculum to mitigate the chance of it being a confounding variable in a test of the efficacy of the intervention.

Intrinsic motivation was addressed in the intervention in the context of interest and enjoyment. Finding a different method for stimulating intrinsic motivation, by adopting a more nuanced approach in helping students explore intrinsic value (Eccles 2007; Wigfield, Tonks & Klauda 2009) and utility value (Hulleman, 2007; Hulleman, Durik, Schweigert & Harackiewicz, 2008; Hulleman, Godes, Hendricks & Harackiewicz, 2010) may enhance the intrinsic motivation dimension of the intervention.

The hypothesis for intrinsic motivation was not supported by this study. However, some evidence was found that may point to opportunities to make adjustments to the intervention using flow theory and research literature to enhance the efficacy of subsequent research. Additionally, the control curriculum may have influenced the change in control group intrinsic motivation. Revising or changing the control group curriculum may be prudent to avoid confounding study results.

Limitations

The limitations to this study pertain to the demographic sample obtained, the intervention context, and the brevity of the intervention. The generalizability is limited due to sample characteristics collected by this study. The demographic variables analysis suggests that these findings are representative of 19-23 year olds of Asian, Caucasian, and Latino ethnicity who are junior or senior undergraduate students.

Another limitation is the generalizability to different academic writing contexts. The writing activities were brief and relatively simple (see Appendix B), and may have involved the students in the task too easily or not enough. Additional research is necessary to evaluate the relevance and influence of several writing activity dimensions

(e.g., task challenge, duration, and complexity). Flow theory and research suggest that the challenge of the task is an integral part of creating a conducive environment for flow to occur.

The duration of the intervention was another limitation. The intervention was very short, only lasting about one hour. This limited the time to discuss challenge-skill balance and intrinsic motivation may not have been adequate to communicate effectively the ideas, allow students to process them, and have an opportunity to practice applying them. Time constraints may have been a major limiting factor in this study.

Future Research

This research provides little evidence that challenge-skill balance, flow, and intrinsic motivation can be influenced by intervention for a specific academic context. Possible avenues for future research could be the exploration of alternative approaches and methods for facilitating comprehension and application of challenge-skill balance and intrinsic motivation to structure and create flow state. Also, exploring optimal flow intervention durations and structures are necessary paths of future research. Additionally, expanding our understanding of creating appropriately challenging activities and of facilitating a sense of control would be useful avenues of research.

Another course of inquiry could be an exploration of flow's utility for different types of academic writing and other academic activities. Challenge-skill balance and flow could offer a variety of opportunities to practitioners and students to structure learning experiences to facilitate enjoyable and meaningful learning.

Conclusion

This study did not find support for any of its research questions or hypotheses. However, it did find some evidence to suggest that additional refinement to various dimensions of the intervention could lead to significant findings. Further research is necessary to explore additional dimensions of challenge-skill balance, intrinsic motivation, and flow and to address possible confounding aspects. Practitioners could use this research to help them structure flow for learning activities and scaffold student understanding of challenge-skill balance, intrinsic motivation, and flow. Students could benefit from this path of research by its ability to empower them actively to structure challenge-skill balance, generate intrinsic motivation, and create flow for their learning activities to enhance their experience of these tasks.

Appendix A: Self-report Flow and Intrinsic Motivation Inventory Measures

Flow State Scale (FSS-2) General

A 7-point Likert-type scale (1 “Strongly disagree,” 2 “Disagree,” 3 “Somewhat disagree,” 4 “Neither agree nor disagree,” 5 “Somewhat agree,” 6 “Agree,” 7 “Strongly agree”) will be used for the FSS-2.

During the academic writing activity

1. I was challenged, but I believed my skills would allow me to meet the challenge.
2. My abilities matched the challenge of what I was doing.
3. I felt I was competent enough to meet the demands of the situation.
4. My attention was focused entirely on what I was doing.
5. I was completely focused on the task at hand.

Note: The license agreement stipulates a maximum of five items listed (see Appendix D).

Intrinsic Motivation Inventory (IMI)

A 7-point Likert-type scale (1 “Not at all true,” 2, 3, 4 “Somewhat true,” 5, 6, 7 “Very true”) will be used for all items of the IMI.

1. I enjoy doing this activity very much.
2. This activity was fun to do.
3. I would describe this activity as very interesting.
4. I thought this activity was quite enjoyable.

Note: Four sample items of the seven item scale are presented. The full scale is available at http://www.selfdeterminationtheory.org/.

Appendix B: Writing Activities

Define “know how.” List three of the biggest things that you need to know how to do to function in your life. What are the differences between “know how” and ingenuity? What are the most important factors associated with taking advantage of “know how”?

Define competence. List three of the most important competencies that you need to have in your life. What are the differences between competence and being a beginner? What are the most important factors associated with competence?

Appendix C: Flow Intervention

Welcome! Thank you for participating. Your responses are confidential. Please respond as honestly and thoughtfully as possible. Please do not work ahead. If you have any questions, please feel free to ask them so that we can work together effectively.

Writing Activity

Please read the prompts and write your response in the space provided. You have ten minutes to complete this activity.

Flow and Intrinsic Motivation Assessments

Please read and answer the following questions.

Introduction

Today, we're going to discuss several dimensions of academic writing. First, what was your most interesting and enjoyable writing assignment? Why? (They will have two - three minutes to respond.) Now, let's go broader. What do you find interesting and enjoyable about academic writing? Why? (They will have two - three minutes to respond.) Would anyone like to share a reason that they find writing interesting? Thank you, would anyone else like to share a reason. Let's look at it in another way. As you can see, there are many reasons why we find academic writing interesting and enjoyable. Perhaps, the creativity of the writing process or the use of imagination in constructing the writing assignment is enjoyable. Another reason may be that we find communicating our ideas an enjoyable experience. For some, developing their skill in writing professionally or effectively communicating ideas can be enjoyable.

Others may find the reasoning and problem solving associated with writing to be an enjoyable and interesting process. However, most of us have some combination of factors that we find enjoyable. Please take a moment and list your three top reasons that you find writing enjoyable. Please organize your reasons hierarchically (most enjoyable, second most enjoyable, and third most enjoyable).

Now, let's talk about academic writing activities. More specifically, how do you typically approach understanding the requirements of an academic writing activity? Please take a moment to reflect on this question and write down your thoughts regarding your approach to academic writing activities. (They will have two - three minutes to respond.) Now, let's look at the process. What is your process when managing an academic writing activity? In other words, what is your typical pattern of approach to structuring academic writing activities? Please take a moment to reflect on this question and write down your thoughts regarding your structuring of academic writing activities. Let's apply this in a different way.

Please analyze the following writing activity and describe in your own words the requirements of the academic writing activity and your typical approach to completing it. Describe patience. Give examples of two times that you were patient. In what two areas of your life could you be more patient? How could being more patient in these areas help you? You will have ten minutes to complete this activity.

How did you assess what is being asked of you in the academic writing activity? Did you include the ten minute time limit in your list? What did your task analysis look like? Something like this: 1) Define patience, 2) Two personal examples, 3) Two areas to

be more patient, 4) Benefits of patience in those two areas 5) Time constraint: 10 minutes. How could performing a task analysis help us approach the academic writing activity?

Let's discuss challenge-skill balancing. Challenge-skill balancing is when you assess the challenge of the activity and adjust it to be customized to you. How might you make this writing activity more challenging? How could you decrease the challenge of the activity without leaving out any of the requirements of the activity? Let's discuss these questions. What are some of the ways that we could make it more challenging? You could add complexity. For example, you could go deeper into the topic or you could add concepts. You could also add challenge by using time constraints or adding additional parameters to the activity. What are some of the ways that we could decrease the challenge without changing the requirements of the activity? Segmentation (i.e., breaking it into smaller more manageable pieces) is a common strategy for decreasing task challenge.

Now, let's put the piece together. How would you use task analysis, your understanding of what you find interesting and enjoyable about the activity, and challenge-skill balance to structure a challenging and enjoyable academic writing activity for yourself? Please take a moment to reflect on this question and write down your thoughts regarding how you could structure a challenging and enjoyable academic writing activity. Would anyone like to share one of your strategies for structuring a challenging and enjoyable academic writing activity? Would someone else like to share

one of your strategies for structuring a challenging and enjoyable academic writing activity?

Does anyone have any questions? Did you make any additional connections or associations to these ideas? Thank you for helping me to understand these ideas more clearly and completely.

Writing Activity

Please read the prompts and write your response in the space provided. You have ten minutes to complete this activity.

Flow and Intrinsic Motivation Assessments

Please read and answer the following questions.

Conclusion of the session

Please be sure to click complete survey to submit your responses. You may not receive credit for your participation today without a completed survey. Thank you for your participation.

Appendix D: Flow Assessment License

www.mindgarden.com

To whom it may concern,

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