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Positive Affect Relevant to Epistemic Curiosity to Reflect Continuance Intention to Join a Hands-On Making Contest

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Hands-on making (e.g., "Maker") has become prevalent in current educational settings. To understand the role that students' epistemic curiosity plays in hands-on making contests, this study explored its correlation to students' positive affect and continuance intention to participate in a hands-on making contest called "PowerTech". PowerTech requires students to produce miniatures in the morning and use the miniatures to take part in relay racing and tug-of-war competitions in the afternoon. Data from 514 individuals were collected and subjected to confirmatory factor analysis and structural equation modeling by AMOS 20. The results revealed the two types of epistemic curiosity (EC), interest (I-type) and informational deprivation type (D-type), played a mediating role in bonding participants' positive affect and their continuance intention to join a hands-on making contest. The implication of this study suggests students' epistemic curiosity can be aroused in the process of participating in competitive hands-on making contests such as PowerTech.

Keywords: positive affect, epistemic curiosity, continuance intention, science and technology contest, hands-on making

INTRODUCTION

As an agent, the PowerTech contest (i.e., a science and technology contest, hereafter "STC") allows students to engage in problem solving. In particular, students need to solve problems arising from the construction of their miniatures and maximize their epistemic curiosity to seek information. In this process, positive affect plays a crucial role because to be a strong competitor in PowerTech STC, students are required to search and apply domain knowledge to overcome challenges, such as imprecisely planning and incomplete structure, to produce

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compatible miniatures to win the contest. In line with problem solving to overcome challenges that arise in PowerTech, the concept of continuance intention could be linked to an individual's overall experience upon knowledge searching and application in participating in a contest.

When students have experience in competitive situations, it can make them more motivated to create and learn (Kernis, 2003). This cognitive evaluation may or may not represent motivation as behavioral intention as the primary factor interplaying with positive affect and epistemic curiosity. Thus, the purpose of this study was twofold: first, to develop a conceptual framework to identify the role of positive affect bonds to epistemic curiosity and reflected to continuance intention to join a hands-on making contest; second, to determine the validity of the pathway by testing the correlates between the students' positive affect and continuance intention mediated by epistemic curiosity.

State of the literature

- Previous studies have focused on linking epistemic curiosity to areas such as facilitating cognitive development and personal growth.
- However, studies have not linked epistemic curiosity with science and technology contests involving hands-on problem solving, which is a crucial path to performance in such contests.

Contribution of this paper to the literature

- A science and technology hands-on making contest such as PowerTech can generate participants' epistemic curiosity.
- High epistemic curiosity levels increase participants' continuance intention to join a science and technology hands-on making contest.
- Increasing participants' positive affect increases their epistemic curiosity

LITERATURE REVIEW

A student's epistemic curiosity and positive affect would likely influence their continuance intention to participate in a competitive STC. Several psychological theories on attitudes and persuasion were previously applied to understand and create favorable attitudes toward an event or object (Ajzen & Fishbein, 1980). These theories argued that an individual's attitude towards an object is influenced by the beliefs and evaluations of that object. In this sense, this study explored the correlation between students' positive affect and continuance intention through epistemic curiosity as an agent of knowledge exploration to win PowerTech.

Epistemic curiosity

Epistemic curiosity (EC) is defined as the individual desire to gain new knowledge by closing information and knowledge gaps and tackling intellectual problems (Litman, 2008; Litman & Spielberger, 2003). EC is categorized into two types; interest type (I-type), which is directly related to the pleasure of discoveries, and informational deprivation (D-type), which is related to eliminating ignorance and uncertainty (Schneider, von Krogh, & Jäger, 2013). I-type and D-type EC are theorized to reflect different orientations towards seeking new information. I-type EC involves focusing on the intrinsic enjoyment of new discoveries, whereas D-type EC is concerned with removing undesirable states of uncertainty (Litman, 2005). This distinction is hypothesized to have important consequences for how individuals approach opportunities to learn new information (Litman, 2008). When I-type EC is triggered, learning new information is expected to result in subjectively successful experiences of increased subsequent engagement. Thus, I-type EC may be conceptualized as a purely intrinsic desire to acquire new knowledge (Ryan & Deci, 2000). Previous studies have focused on linking epistemic curiosity to some crucial variables in different areas, such as in facilitating personal growth (Kashdan, Rose, & Fincham, 2004), job performance (Mussel, 2010), and behavior in online communities (Schneider, von Krogh, & Jäger, 2013). However, rarely have studies linked epistemic curiosity with hands-on problem solving, which is a crucial path to team competitiveness and performance (Wright & Walton, 2003).

Goal-oriented tasks specify the behaviors, skills and strategies that are essential for effective task execution (Mullen, Faull, Sian Jones, & Kingston, 2015). For D-type EC, engagements are enhanced through *performance-oriented* learning goals (Litman, 2008, 2014). A previous study has defined curiosity as the choice of actions to obtain information to accomplish the goal (Gottlieb, Oudeyer, Lopes, & Baranes, 2013). The exploratory actions in PowerTech are aimed to stimulate the participants' epistemic states. That is, the participants may need to conquer problems that arise from the construction of the miniatures with both I-type and D-type EC (e.g., accuracy and fit of the parts to ensure the miniature can move straight). Participants have to search or verify knowledge in order to optimize the competitive features of their miniatures, which can ultimately become critical factors for the relay racing and tug-of-war competitions.

Positive affect

Positive affect refers to a related set of emotions of positive valence and high energy, such as cheerfulness, self-assurance, and attentiveness (Watson & Tellegen, 1985). Positive affect may also influence recovery from acute stress because it is associated with greater flexibility in thinking and problem solving (Ashby, Isen, & Turken, 1999) and adaptive coping strategies, such as positive reappraisal or problem-focused coping (Tugade & Fredrickson, 2004). Moreover, in laboratory studies, researchers have found that positive affect facilitated creative problem solving (Isen, 2001) and extended information searching (Doucet, Thatcher, & Thatcher, 2012). In this regard, the present study adapted positive affect as the factor relevant to knowledge exploration or problem solving strategy during participation in PowerTech.

Continuance intention

Ajzen (1991) argued that "intentions are assumed to capture the motivational factors that influence a behavior" (p. 181). When individuals form a positive attitude towards an event, they would have stronger intention toward adopting it; thus, they would be more likely to participate. Moreover, Jasperson, Cater, and Zmud (2005) defined post-adoptive behavior as a ''myriad of feature adoption decisions, feature use behaviors, and feature extension behaviors" (pp. 525-527). The salient beliefs of behavioral intention are conditional to the context; researchers' identification of beliefs for behavior relies on a specific population and context (Ajzen & Fishbein, 1980). In this regard, this research focused on continuance intention in the context of post-adoption behavior to join a hands-on STC.

RESEARCH HYPOTHESIS AND MODEL

Most behavioral theories are based on an epistemic framework that focuses on an individual's thoughts, evaluations and beliefs. Research in the area of positive psychology has increased our understanding of the value of positive affect in relation to why and how they matter externally (Kanis, Brinkman, & Perry, 2009). Therefore, the aim of this research was to explore the correlates between positive affect, epistemic curiosity and continuance intention to participate in PowerTech. Accordingly, this study addressed the correlates between the constructs as follows.

Positive affect relevant to epistemic curiosity

Individuals in a positive mood enjoy cognitive advantage over their counterparts and experience fewer difficulties in adapting to new situations (Djamasbi, Strong, & Dishaw, 2010). Similar to the case of a new learning situation, positive emotion adaptation to the situation helps individuals generate better or more positive

outcomes (Szeto & Cheng, 2014). The component of attitude refers to an individual's beliefs and thoughts towards events as either good or bad in influencing emotional attachment. In facing challenges, students are faced with affect-eliciting factors, such as fear of performing poorly on evaluations and the need to improve performance (Strain, Azevedo, & D'Mello, 2013). Conversely, positive affect has been associated with better creative problem-solving and more exploratory behavior (e.g., Estrada, Isen, & Young, 1997). That is, it is likely that positive affect may increase the level of an individual's epistemic curiosity in the process of problem-solving and information searching. Therefore,

H1: Positive affect is positively correlated to I-type of EC.

H2: Positive affect is positively correlated to D-type of EC.

Epistemic curiosity relevant to continuance intention to join STC

Curiosity concerns an embrace of novelty and openness to new experiences, and a person using curiosity to observe events will continue to experience more exploration in those events (Kashdan et al., 2011). As a consequence, continuance intention is likely to be another important affective element in one's exploratory experience. Considering curiosity would affect motivation (e.g. Oudeyer, Baranes, & Kaplan, 2013), this directs research to employ epistemic curiosity as an antecedent to behavioral intention. Thus, the following hypotheses were proposed:

H3: I-type EC is positively correlated to continuance intention.

H4: D-type EC is positively correlated to continuance intention.

Research model

To confirm the attitude–behavior consistency, an individual's positive affect, two types of epistemic curiosity, and continuance intention were perceived as interrelated, and act jointly as important affective factors when participating in PowerTech. The research model proposed is shown in Figure 1.

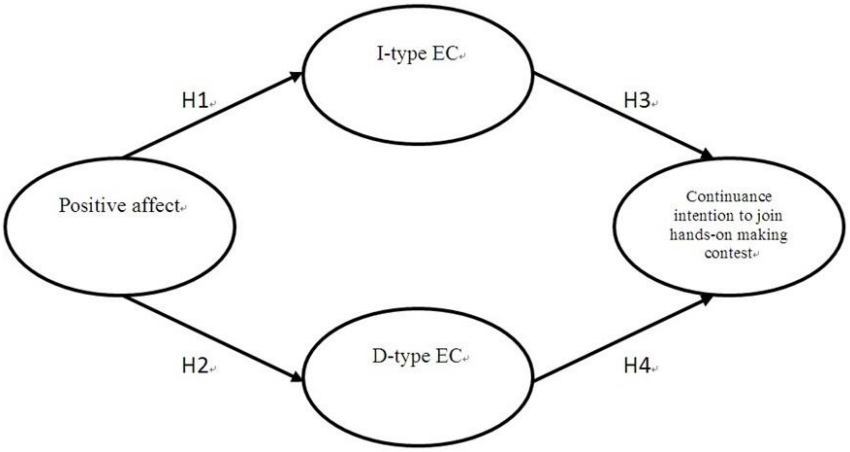

Figure 1. Research model

POWERTECH: A SCIENCE AND TECHNOLOGY CONTEST

STCs such as PowerTech encompass three interdependent dimensions: knowledge, ways of thinking and practical skills (Pearson & Young, 2002). Constantinou, Hadjilouca, and Papadouris (2010) highlighted the importance of engaging students in explicit contests, which have provided useful insights into possible ways of acquiring knowledge. Accordingly, one of the greatest challenges facing students during PowerTech is to complete building the miniatures within the limited time while utilizing their science, technology, engineering and mathematics

(STEM) knowledge (Judson, 2014; Authors, 2013). Students who participate in STC contests are confronted with novel and unfamiliar problems and have to think quickly and critically to conquer the challenges (Authors, 2013). A clip of 2014 PowerTech contest can be found at https://www.youtube.com/watch?v=TImhb8jniRE.

RESEARCH DESIGN

Research method

Vogt (2007) confirmed convenience sampling as being the most common form of sampling and this is still true in contemporary social science research. Accordingly, the present study adopted convenience sampling based on the students who participated in the 2014 PowerTech contest and who were willing to complete the questionnaire. There were a total of 780 students who participated in PowerTech. Upon registering in the PowerTech contest online, the system gave each participant a code, and their email address was recorded. The epistemic curiosity and positive affect questionnaire was handed out to the 780 participants on the day of the 2014 PowerTech contest and 651 effective questionnaires were returned. The questionnaire on continuance intention to join a hands-on making contest was emailed to those 651 participants (who had returned an effective epistemic curiosity and positive affect questionnaire). We asked these participants to return the continuance intention questionnaire one week after the contest date in mid-December 2014. One week after the PowerTech contest, a total of 537 questionnaires were returned. After ineffective questionnaires (i.e., incomplete questionnaires or where student selected the same answer throughout the entire questionnaire) were eliminated, there were 514 valid data samples that were taken into consideration.

In regards to ethics, the students were informed that they were not obligated to participate in the research project. Informed consent to participate in the study was sought from all students, and anonymity and confidentiality were maintained. The importance of maintaining confidentiality of personal information was stressed to participants in the introductory statements.

Participants

The present research investigated the interplay among positive affect, epistemic curiosity and continuance intention in making miniatures for PowerTech for elementary school and junior high students aged 13-14. The 514 sample comprised of more male (345, 67.1%) than female (169, 32.9%) participants. There were 279 (54.3%) participants from elementary school and 235 (45.7%) participants from junior high school. There were 111 (21.6%) fifth grade participants, 168 (32.7%) sixth grade participants, 155 (30.2%) seventh grade participants, 80 (15.5%) eighth grade participants.

Measuring questionnaire

The measuring questionnaire items were adapted from previous studies and translated into Chinese then subjected to confirmatory factor analysis to explore the correlates of positive affect, epistemic curiosity, and continuance intention to participate in a hands-on making contest. A Five-point Likert scale was used to measure the items.

Positive affect (PA): PA measures states and traits (Lyubomirsky, King, & Diener, 2005). The state of positive affect may influence adaptive coping strategies in problem solving (Ashby, Isen, & Turken, 1999), such as positive reappraisal or

problem-focused coping. The present study designed measuring items by adapting the definition of PA (Gray & Watson, 2007) for this self-report measure.

Epistemic curiosity: To assess individual differences in EC, Litman and Spielberger (2003) developed a 10-item epistemic curiosity scale, which comprised of two five-item subscales: The first, labeled I-type EC, measured interest in exploring unfamiliar topics in order to learn something new (e.g., "I enjoy exploring new ideas"); the second subscale, D-type EC, inquired about attitude in solving problems and figuring out how things work (e.g., "When I am given a new kind of technical problem, I try to work out the solutions before I go to bed"). Accordingly, this study adapted the items that are relevant to PowerTech.

Continuance intention: Examination of continuance intention has been developed around the derivation of learning interest (e.g., Bhattacherjee, 2001). Items of continuance intention were stated in the sense of "Even if situation X arises, I will do Y" (Gollwitzer, 1999). They specify a situational cue as the "Even", which indicates joining with a goal-directed response (i.e., to win PowerTech contest) as a "do" (i.e., continuance intention to participate). Based on this, we adapted this causality to design the items of continuation intention.

Reliability and validity analysis

After applying first-order confirmatory factor analysis, items where the residual value was over 0.5 were cancelled from the original questionnaire (Hair, Black, Babin, & Anderson, 2009). The remaining items were kept in the questionnaire; items in positive affect were reduced from 8 to 6, items for I-type EC were reduced from 7 to 5, items for D-type EC were reduced from 7 to 5, and items for continuance intention were reduced from 5 to 4. The reliability and validity of questionnaire were analyzed as follows.

First, the discriminative power of the scale was determined by its ability to discriminate the items of the instrument and was examined by independent *t*-test to explain the discriminative power of each item. One frequently used technique for assessing whether an item is properly discriminating is to select those individuals in the top and bottom 27% of the subscale score distribution (Cureton, 1957; Preacher, Rucker, MacCallum, & Nicewander, 2005) and to test whether there is a statistically significant difference between the two groups' mean scores on the item to yield a *t*-value as the critical ratio (Himmerlfarb, 1993). If the critical ratio (*t*-value) is larger than 3, the discriminative power is significant. Table 1 showed that all critical ratio (*t*-values) were larger than 3 ($p < .001$***). This indicated that the subscales all reached significance level, and suggested that all items were discriminative (Green & Salkind, 2004). Second, internal consistency can be determined by examining the composite reliability (CR) of the constructs (Fornell & Larcker, 1981). All composite reliability values in the present study ranged from 0.73 to 0.88, which surpassed the suggested threshold value of 0.7 (Hair, Black, Babin, & Anderson, 2009). Third, convergent validity refers to the degree to which multiple items measure one construct. Convergent validity in the present study was evaluated by verifying: (1) the average variance extracted (AVE) values were above 0.6 (Fornell & Larcker, 1981); and (2) the factor loadings of all items were significant and above 0.6. These conditions were met, which indicated acceptable convergent validity (Hair et al., 2009).

Fourth, to evaluate the consistency of the variables, the reliability of the questionnaire was assessed using Cronbach's α. According to Hancock and Mueller (2006), a Cronbach's α value above 0.7 indicates an acceptable level of reliability. Table 1 showed the Cronbach's α values and they were above 0.7. The alpha values for positive affect, I-type EC, D-type EC, and continuance intention were 0.79, 0.90, 0.82, and 0.89, respectively, which suggested the variables were reliable (Byrne,

Table 1. Results of the confirmatory factor analysis

Items	Mean	SD	Loading	*t*-value
Positive affect: M=3.67, SD=0.75, CR=0.82, AVE=0.68, α=0.79				
1. When my work gets ruined, I am aware that everyone makes mistakes and that all I have to do is start over.	3.49	0.83	0.76	189.20
2. When my work is imperfect, I am aware that modifications can be made to meet the standard.	3.60	0.73	0.68	220.67
3. When my work gets ruined, I believe that modifications can bring about outcomes that are better than expected.	3.63	0.75	0.74	218.37
4. When others criticize my work, I think it is good that they are helping me identify problems.	3.57	0.77	0.70	208.14
5. When I am asked to modify my work, I make my best efforts to do so.	3.88	0.70	0.83	250.06
6. When my work gets ruined, I will figure out a strategy and initiate modifications.	3.85	0.71	0.79	244.40
I-type EC: M=3.58, SD=0.79, CR=0.73, AVE=0.65, α=0.90				
1. I enjoy exploring new ideas when I find new ways for making PowerTech miniatures.	3.25	0.81	0.73	251.13
2. I find it fascinating to learn new information, especially when I learn something new from making the miniatures.	3.55	0.77	0.81	194.23
3. When I see a complicated piece of machinery, I will ask someone how it works, for when I design my miniatures.	3.75	0.74	0.77	176.38
4. I enjoy discovering difficult concepts encountered during the miniature making process.	3.74	0.76	0.72	189.56
5. When I learn something new, I will like to find out more about it, to help design my miniatures better.	3.65	0.87	0.77	210.35
D-type EC: M=3.39, SD=0.85, CR=0.84, AVE=0.61, α=0.82				
1. I can spend hours on a problem because I cannot rest without finding the answer.	3.23	0.84	0.81	204.37
2. I brood for a long time when I encounter problems in miniature design.	3.45	0.79	0.86	213.24
3. When designing miniatures, conceptual problems keep me awake thinking.	3.34	0.86	0.76	208.67
4. I get frustrated if I cannot figure out a problem, so I work harder when I construct my miniature.	3.43	0.94	079	210.51
5. I work like a fiend at problems that I feel must be solved when I work on my miniatures.	3.51	0.81	0.85	198.68
Continuance intention: M=3.48, SD=0.89, CR=0.88, AVE=0.63, α=0.89				
1. I would continue to participate in future PowerTech contests, even if it is unrelated to entrance to high school.	3.56	0.85	0.78	178.25
2. I would continue to acquire knowledge in relation to PowerTech, even if it is unrelated to my high school courses.	3.47	0.89	0.71	191.54
3. I would continue making PowerTech miniatures, even if it is unrelated to my high school major.	3.61	0.87	0.74	185.67
4. I would continue making miniatures of PowerTech, even if it is unrelated to my high school courses.	3.28	0.95	0.75	197.18

2001). Finally, Table 1 also showed the mean values of each dimension were between 3.39 and 3.67 and the standard deviations were small, which indicated a low degree of dispersion (Hair et al., 2009).

RESULTS

The analysis was performed in two steps. After confirmatory factor analysis (CFA) was applied to analyze item suitability and test the reliability and validity of questionnaire, AMOS 20 was used to verify path model over the covariance-based structural equation modeling (SEM).

Model fit analysis

Table 2 provides a summary of indices of the goodness of fit test. With regard to the measures of fit, χ^2 (264) = 726.54, and the chi-square/degree of freedom ratio was 2.75, which satisfied the criterion that chi-square/degree of freedom ratio

should be less than 3 (Hair et al., 2009). This means that the model possessed explanatory ability. Table 2 also showed the other indices and interpretation standards and the RMSEA was 0.051 (< 0.08), the goodness of fit index (GFI) was 0.92 (> 0.9); SRMR was 0.044 (< 0.5); NNFI was 0.99 (> 0.9); and CFI was 0.99 (> 0.9). All values met the threshold criteria for goodness of fit, which indicated that the proposed model provided a good fit to the data (Bagozzi & Yi, 2012). Finally, Hoelter's critical number (CN) was 304.06 (>200), which indicated the sample size was sufficient (Kline, 2011).

Path analysis

Figure 2 showed the results of the research model with the standardized regression coefficients (SRC) for each of the hypotheses. The results indicated that positive affect was correlated to I-type EC, and D-type EC, with significant SRCs of 0.68, and 0.71, respectively. The results also indicated that I-type EC, and D-type EC were correlated to continuance intention, with significant SRCs of 0.86, and 0.62, respectively.

According to the result, the direct effect between the constructs was as follows: from PA to I-type EC was 0.68 of PA, from PA to D-type EC was 0.71, from I-type EC to continuance intention was 0.86, and from D-type EC to continuance intention was 0.62. The indirect effect of continuance intention from PA through I-type EC was 0.58, and from PA through D-type EC was 0.44. The total effect of continuance intention was 2.5.

From the above results, Table 3 showed the results of the path relationship among the hypotheses, and hypotheses 1 through 4 were supported. Figure 2 showed the explanatory power of positive affect on I-Type EC was 47%. The explanatory power of positive affect on D-type EC was 51%. The explanatory power

Table 2. Goodness of fit

Goodness of fit measures	Results	Thresholds
Absolute fit measures		
Goodness of fit index (GFI)	.92 – Good fit	> 0.9
Adjusted goodness of fit index (AGFI)	.90 – Good fit	> 0.9
Standardized root mean square residual (SRMR)	.044 – Good fit	< 0.05
Root mean square error of approximation (RMSEA)	.051– Good fit	< 0.08
Incremental fit measures		
Non-normed fit index (NNFI)	.99 – Good fit	> 0.9
Comparative fit index (CFI)	.99 – Good fit	> 0.9
Parsimonious fit measures		
Parsimonious normed fit index (PNFI)	.86 – Good fit	> 0.5
Parsimonious goodness-of-fit index (PGFI)	.75 – Good fit	> 0.5
Hoelter's critical number (CN)	304.06 – Good fit	> 200

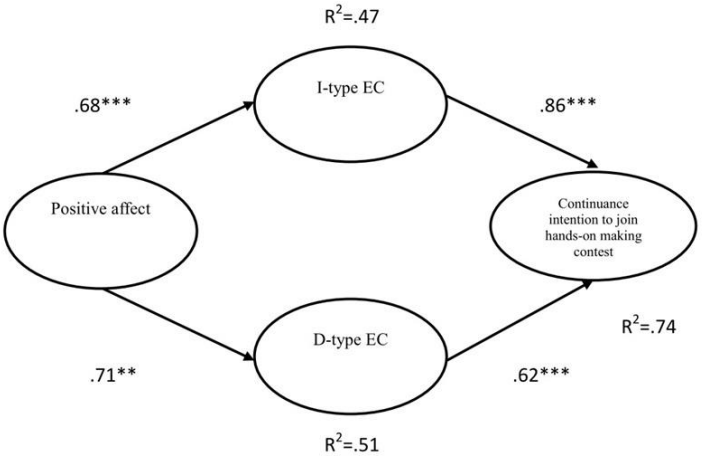

Figure 2. Verification of research model

Table 3. Verification of the hypotheses

Hypotheses	Result
H1: Positive affect is positively correlated to I-type EC.	Supported
H2: Positive affect is positively correlated to D-type EC.	Supported
H3: I-type EC is positively correlated to continuance intention.	Supported
H4: D-type EC is positively correlated to continuance intention.	Supported

of I-type EC and D-type EC on continuance intention was 74%. Hence, the dependent variable in the research had reasonable predictive ability (Hair et al., 2009; Byrne, 2010).

DISCUSSION

Based on students' experiences of participating in PowerTech, this study attempted to explore the interrelatedness of the two types of epistemic curiosity to positive affect and their continuance intention to attend a hands-on making contest. According to the SEM analysis, positive affect was positively correlated to the two types of epistemic curiosity and H1 and H2 were accepted. Moreover, I-type EC and D-type EC were both positively correlated to continuance intention to join a hands-on making contest and H3 and H4 were accepted.

In examining Hypotheses 1 and 2, the results of this study revealed positive affect was positively correlated to I-type EC and D-type EC. When a student encounters a challenge, they are faced with affect-eliciting factors, such as the fear of performing poorly on subsequent evaluations and the need for improvement (Strain, et al., 2013). Moreover, Strain et al. (2013) argued that positive affect is activated throughout the cognitive process in problem solving and efficient decision making. That is, positive affect has been associated with better creative problem-solving and more exploratory behavior (e.g., Estrada, Isen, & Young, 1997). The results of this study supported the above excerptions and revealed that a high level of positive affect led to a high level of the two types of epistemic curiosity.

In examining Hypotheses 3 and 4, the results of this study revealed that both I-type EC and D-type EC were positively correlated to continuance intention to attend a hands-on making contest. The PowerTech contest requires process improvement including finding new information or ideas to solve problems and verifying the new information to enhance the functional quality of the miniature for competition (Authors, 2013). By *predicting the intention,* Bonchek-Dokow and Kaminka (2014) argued that the objective of winning a competition can extend participants' actions to continue engagement. Supporting this argument, the result of this study showed that a high level of the two types of epistemic curiosity led to a high level of continuance intention to engage in the PowerTech contest.

CONCLUSION

This study introduces a novel, focused perspective to explain the cognitive-affective factors in relation to epistemic curiosity and continuance intention to attend a hands-on making STC. Besides connecting positive affect and the two types of epistemic curiosity, this study further increases our understanding in relational dynamics by showing the two types of epistemic curiosity could promote or inhibit participants' continuance intention. The result of this study seems to have an even more meaningful combinative influence on continuance intention to participate in STC than demonstrated in prior research.

Accordingly, as a goal orientation, PowerTech encourages students to explore more information to solve problems, which constitutes a part of epistemic curiosity for process improvement in designing and constructing the miniatures to enable it

to increase its speed and torque force when competing in relay racing and tug-of-war. Thus, through making PowerTech miniatures, students can engage their epistemic curiosity in seeking and verifying their STEM knowledge. In line with this, a practical implication is that teachers can use PowerTech, or similar STCs, as an instructional tool to promote students' epistemic curiosity in scientific learning. That is, teachers may guide students to be more knowledgeable and stimulate their epistemic curiosity when they prepare for and participate in hands-on making STCs.

Personality is one of the most robust predictors of positive affect and negative affect (DeNeve & Cooper, 1998). Costa and McCrae (1980) noted that negative affect correlated to characteristics associated with neuroticism, and positive affect correlated to characteristics associated with extraversion. Hassan, Bashir, and Mussel (2015) pointed out the mediating role of personality in the context of epistemic curiosity and learning in continuing education. In this sense, another theoretical implication of this research is that personality could also play an essential role in relation to students' epistemic curiosity to affect their continuance intention to attend a hands-on making STC.

LIMITATION AND FUTURE STUDY

Many theories of motivation are based on a cognitive framework that focuses on individual thoughts, evaluations and beliefs (Meyer & Turner, 2002). Although this study considered emotions as outcomes, further research can be conducted on other cognitive factors, such as scientific reasoning in relation to construction of PowerTech miniatures.

The explanatory mechanism of this study did not consider collaboration with a team and failed to find results supporting the influence of social exchange mechanisms. Future research can explore the effects of social reciprocity on making miniatures when students work as a team with more commonly recognized exchange-based dynamics that implicate how a collaborative setting influences individual cognitive-affective factors.

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