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Developing and testing inhibitors of curiosity in the workplace with the Curiosity Code Index (CCI)

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Abstract

A new tool was created to assess the factors that inhibit curiosity in working adults. The Curiosity Code Index (CCI) measures four factors that inhibit curiosity: fear, assumptions, technology, and environment. The validity of the CCI was evaluated using exploratory and confirmatory factor analyses. The factor analysis with Varimax Rotation indicated a Cronbach α of .85 for fear, .68 for assumptions, .86 for technology, and .75 for environment. Although there are other tools that measure whether individuals are curious or open to experience, there are no tools that measure these four factors that inhibit curiosity. The results indicate that the CCI is a valid tool.

Keyword: Psychology

1. Introduction

Curiosity has captured the attention of behaviorists, researchers, business leaders, and others who desire to know what makes people motivated, driven, and productive. Curiosity has been categorized as a personality trait (Mussel et al., 2012). Curiosity can be an essential component of success in business. Antanacopoulou and Bento (2018) found that curiosity is fundamental to a leader's ability to handle

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change, complexity, context, and connectedness. If we can correlate curiosity with engagement, emotional intelligence, innovation, and productivity, it behooves us to determine what factors inhibit it (Leonard and Harvey, 2007; Lohman, 2009; Pinar et al., 2016; Reio and Wiswell, 2000). Although there are many assessments that measure if people are curious, there is very little research into assessments that determine what keeps people from being curious. We know that children have a natural sense of curiosity. We have seen how that can begin to drop as they become school-aged. McGarvey (1990) found that kindergarteners' creativity ranked at 84%, dropping to 10% by grade two. Curiosity has been linked with the development of knowledge, logic, and psychological health (Cavorjova and Sollar, 2007).

To begin the process of improving curiosity in the workplace, it was important to discover the factors that might impact curiosity. Therefore, a survey was posted in a business group within LinkedIn, which is a social media site for business professionals. Participants were asked the following open-ended question: What are the main things that hold you back from being curious? After accepting one thousand responses, the responses were analyzed for similarities and placed into categories based on those similarities. After reviewing all responses, there appeared to be four distinct factors that could inhibit curiosity, including fear, assumptions, technology, and environment.

This research was focused on the workplace due to the gap in the literature for assessing curiosity in that arena (Mussel et al., 2012). Although there are assessments like the German Work-Related Curiosity Scale, they do not address the inhibitors of curiosity (Mussel et al., 2012). Many of the assessments on the market take into account openness to experience, which is associated with the Big Five personality traits. However, even the Big Five does not address inhibitors (Mussel et al., 2012).

2. Background

Motivation, drive, and curiosity are popular topics in organizations as leaders strive to be more productive. Curiosity is a desire to discover new information and experiences which motivates behavior (Berlyne, 1954; Kashdan, 2009; Litman, 2010). One of the pioneers of curiosity research was Berlyne (1954) who evaluated epistemic curiosity, which is filling in existing gaps of knowledge and perceptual curiosity, which is the desire to acquire new information. Some of the biggest names in psychology have shone a positive light on the importance of curiosity. Maslow (1970) acknowledged curiosity as one of the most important factors associated with acquiring knowledge. The problem in the past has been to develop an instrument that can truly measure the factors associated with curiosity (Cavorjova and Sollar, 2007).

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Several scales measure trait curiosity. Kashdan et al. (2009) created the Curiosity and Exploration Inventory Scale, which assess exploration and absorption of information. Later Litman and Jimerson (2004) added the element of deprivation to the assessment. Although available assessments are beneficial for determining if individuals are curious, they do not assess factors that inhibit curiosity. Even the most researched instruments have had limitations (Ye et al., 2015). Therefore, having properly worded items was expected to be a challenge. Even Kashdan and colleagues (2009) found it necessary to revise the original CEI and developed the CEI-II. Assessments can require adjustments to include greater predictive power and offer new research opportunities (Kashdan et al., 2017).

3. Design

The following research was performed to determine factors that inhibit curiosity.

4. Methods

After having received certification from The Collaborative Institute Training Initiative (CITI) to ensure ethical human subject research, a test pilot was conducted. To validate a survey instrument, the following order of processes were important: Establish face validity, pilot test, clean dataset, principal component analysis, Cronbach's Alpha, and revise and repeat as needed.

5. Analysis

To determine potential factors that could inhibit curiosity data was collected from two groups. The first sample consisted of business leaders (75 women and 92 men) from a virtual leadership group. The second sample consisted of business professionals (120 women and 110 men) from a social media group. This assessment was not intended for children. All participants were over 18 years of age. Many of the curiosity instruments have been tested on undergraduates (Litman and Spielberger, 2003). However, this assessment was intended for use in working adults; therefore the sample was obtained from business professionals. An exploratory factor analysis was used to examine the data.

Four surveys were used for this research. The first was a pilot survey posted on LinkedIn, to determine the factors that working adults believed to inhibit curiosity. The survey included the open-ended question: What are the main things that hold you back from being curious? After accepting one thousand responses, the wording was analyzed for similarities and placed into categories based on those similarities. After reviewing all responses, there appeared to be four distinct factors that could inhibit curiosity including fear, assumptions, technology, and environment. To

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create questions that could measure these factors, a psychometric statistician was consulted. Past research (Andrews and Gatersleben, 2010; Collins et al., 2004; Kashdan, 2009; Prochniak, 2017) was used to determine the process other top researchers in the field have used to validate their curiosity instruments.

After the pilot revealed the potential four factors, the first survey was sent to 520 participants. This initial survey used questions created by the psychometric statistician. However, the results did not produce a successful factor analysis, and therefore her suggested questions were discarded. Her questions appeared to determine whether individuals were curious or not. That was not the intent of this research, so her data was not used in this study. Hamilton formulated all questions in the second and third rounds of surveys. After reviewing the results from the second survey sent to 539 participants, it appeared some questions were vague and did not align well in factor analysis. The wording was made more specific to fear, assumptions, technology, and environment, in the third survey that was sent to 518 participants. The factor analysis proved most successful in the final round. Therefore, those final questions given to the 518 participants were chosen for the Curiosity Code Index instrument.

Fear included questions about failure, embarrassment, lack of control; Assumptions included questions about lack of interest, laziness, lack of necessity; Technology included questions about having technology solving issues for them, lack of exposure to technology, and too much information to process. Environment included questions about the impact of educators, work relationships, and family, peers and friends. The psychometric statistician created questions that were created on a 5-point Likert scale (1 = strongly agree, 2 = agree, 3 = neither agree nor disagree, 4 = disagree, 5 = strongly disagree).

After the initial pilot survey (n = 1000) determined there could be four factors that impact curiosity, it was necessary to create a questionnaire to test questions to determine if they would align well in factor analysis. There were three rounds of surveys sent to use for factor analysis (n = 520, n = 539, n = 518). In each round, respondents were instructed as follows: "The following is a survey to determine things that might impact your level of curiosity. Please be sure to respond to all questions." The first survey included 32 questions, with reverse questions to check for honesty.

However, the results did not support four factors and had a low Cronbach α. Many of the questions overlapped. Some overlap was to be expected since there can be a fear of technology for example. Because at face value, these four factors appeared important. The initial questions were scrapped, and 48 questions were rewritten with the inclusion of reverse questions again to check for honesty.

The second round of questioning indicated better alignment to separate factors, but the Cronbach α was still low. It was determined the questions were not specific

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enough to the issues. For example, the psychometric statistician created questions that were more likely to measure curiosity than what inhibited curiosity due to fear, assumptions, technology, and environment. Therefore, the third attempt was created by Hamilton to include questions that aligned more specifically to the issues addressed. Final factor analysis came in with alignment with four factors with a Varimax Rotation that indicated a Cronbach α of .85 for fear, .68 for assumptions, .86 for technology, and .75 for environment.

Because the Curiosity Code Index (CCI) has been granted a registered trademark, it is not appropriate to list all the questions. However, example questions include:

Fear – I avoid asking questions that might make me look stupid.

Assumptions – There are subjects I would not read about because they are probably boring. Technology – Technology makes me feel overwhelmed with too much information.

Environment – My family made me feel uncomfortable if my interests did not align with theirs.

6. Results and discussion

A primary goal of this study was to determine if there were factors that could be attributed to having a negative impact on curiosity. A pool of 36 items was used in the final instrument with factor loadings collected for 518 participants (Table 1). Twelve of those items were used as reverse questions to determine honesty in responses. The demographics for the final group (n = 518) include 47% male and 53%

Table 1. A sample of factor loadings for 12 of the questions (n = 518).

Questions	Fear	Technology	Assumptions	Environment
1			0.548	
2				0.672
3			0.718	
4				0.725
5			0.529	
6		0.539		
7	0.551			
8		0.705		
9				0.516
10	0.536			
11		0.686		
12	0.667			

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Table 2. Cronbach alpha for the four factors.

Factor/example		
Question	**M (SD)**	**Cronbach's alpha**
Fear		
Incompetence	3.20/1.091	0.851
Technology		
Change required	3.13/1.127	0.875
Assumptions		
Sounds boring	2.99/1.131	0.681
Environment		
Teacher's time	3.57/1.060	0.750

female. Ages included: 21% were between 18−29; 25% were between the ages of 30−44; 34% were between the ages of 45−60; and 30% were over 60.

Throughout the three survey attempts, the questions that did not load well were rejected. The final assessment included 36 questions that included nine questions for each of the four areas that inhibit curiosity. The Cronbach alpha was higher for fear and technology (.85 and .88), lower for environment (.75) and lowest for assumptions (.68) (Table 2). Future research will need to be completed to determine if there is enough overlapping to re-evaluate factors. However, it was anticipated that it would be challenging to have factors that did not have some overlap.

The following is an example of a factor analysis to demonstrate their alignment into four separate factors.

7. Conclusion

The CCI will be used as part of continuing research into the area of curiosity and the factors that inhibit. It could be essential to research correlations between curiosity inhibition and performance including engagement, productivity, and innovation. Although multiple assessments determine whether people have high or low curiosity, there is nothing that has been published that determines the factors that inhibit curiosity. For organizations to develop their employees, it is essential for them to be able to receive a baseline measurement regarding their levels of curiosity. The CCI could foreseeably be one of the instruments that could be part of the next movement to enhance human performance.

A limitation of this study is that the data was obtained through SurveyMonkey, which limits the generalizability of the results. Although it is possible to know that the respondents were all over 18 years of age, it is impossible to determine if the respondents were working adults. In the future, it is vital to study employees in organizations to determine the factors that are most problematic in the real-

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world setting. The highest loading questions from factor analysis were used in the final assessment. Some of the Cronbach alpha values were in the acceptable to good range. It was challenging to determine why the alpha values were lower for some of the assumption questions.

The questions were randomized so the lower values cannot be due to fatigue from having one category listed later in the survey than another. However, factors like fear might have been easier for people to recognize than assumptions.

Any assessment can be improved. Current research is being considered to evaluate additional questions for a potential follow-up assessment such as a CCI 2.0. Potential ways to improve questions could be to make them more specific and less general. It would require multiple versions of surveys to determine which questions would be most effective. The highest-loading questions from factor analysis were used. It is more common to start with the final analysis with a confirmatory factor analysis, followed by an exploratory analysis. However, since the pilot study had already been completed, the procedure was adjusted to best utilize those results.

Declarations

Author contribution statement

Diane Hamilton: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Competing interest statement

The authors declare no conflict of interest.

Additional information

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