RELATIONSHIP BETWEEN THE SUBJECTIVE TASK VALUE OF A COURSE AND LEVEL OF TRANSFER DISPLAYED BY LEARNERS OF COGNITIVE BEHAVIORAL THEORIES

by

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Abstract

The ability to transfer knowledge to novel contexts is one of the most important goals that our educational institutions must achieve. Motivation is one of the many factors that influence students’ learning, performance, and their ability to transfer. However, not many researchers have studied the role of motivation in transfer keeping in view Eccles’ Subjective task value theory. The present study explored the role of subjective values students associate with cognitive development theories they studied in an educational psychology course, in their ability to transfer knowledge learned in lecture to a novel context. Participants were 45 college students in an educational psychology course. They were asked to complete the subjective task value instrument, the fundamental knowledge test and the transfer test. Based on the literature, it is hypothesized that if the subjective value of a task has a role to play in the level of transfer that learners display, there will be a strong correlation between their scores on the subjective task value instrument and transfer test. Nevertheless, the results showed that there is no relationship between learners’ value beliefs and their ability to transfer. However, the results showed a significant relationship between fundamental understanding and transfer. Future research taking the nature of instruction into account and that test the learners for transfer multiple times during a single semester would perhaps give us a much clearer picture of the determinants of the learners’ failure to transfer.

Keywords: transfer, subjective task values, expectancy value theory, intrinsic value, attainment value, cost, utility.
Relationship Between the Subjective Task Value of a Course and Level of Transfer Displayed by Learners of Cognitive Behavioral Theories

Perkins and Salomon (2012) reflected that “Schools are supposed to be stopovers in life, not ends in themselves” (p. 248). This line perfectly articulates the shortcomings of our education system. If our education systems were apt to fulfill what this sentence points out, then what we learn in schools should be helpful to us in the real-world. It should be knowledge-to-go, which is not the case majority of the time (Perkins & Salomon, 2012). There are different factors, such as sufficient degree of initial learning (Klahr & Carver, 1988; Littlefield et. al., 1988; Lee & Pennington, 1993), the way the information is learned (Judd, 1908), the extent to which information is contextualized (Bjork & Richardson-Klahaven, 1989; Gick & Holyoak, 1980), and appropriate levels of abstraction (Chen & Daehler, 1989; Luchins, 1942; Singley & Anderson, 1989) that either hinder or promote the transfer of learning into novel contexts but this paper does not discuss those. The present study focuses on the motivational aspects that potentially influence learners’ tendency or ability to transfer knowledge. More specifically, the current paper will study whether subjective values ascribed to tasks (in this case the task is material related to cognitive development theories) have an influence on learners’ ability to transfer the knowledge gained from these theories into novel contexts.

Perkins and Salomon (1992) defined transfer as a phenomenon where learning in one context improves performance in another context. For example, if a carpenter who studied geometry applied that knowledge to designing a piece of furniture, it would be called transfer. Many researchers have suggested that transfer is hard to detect, not because it does not exist but because the tests used to measure transfer are usually merely tests of retention. Broudy (1977) notes that people easily forget the things they learn in schools, which might be measured by tests
of “replicative knowing” (p. 6). He also points out that majority of people have trouble with “applicative knowing”, which is to be able to apply previously learned knowledge to solve novel problems. Broudy (1977) further explains that school is a failure based on replicative and applicative tests of learning and that we must reconsider the meanings we associate with learning, and the way we evaluate these learning experiences.

Consequently, tests of memory can make different kinds of learning experiences appear the same but these experiences tend to look completely different on tests of transfer (Morris, Bransford, & Frank, 1977). Thorndike and Woodworth (1901) also stressed that individuals who may perform well on a test related to content they had practiced initially, might not do so well when asked to transfer that learning into a novel context. This highlights the importance of differentiating between measures of simple recall and measures of transfer because they are not interchangeable.

Moreover, to be able to transfer something effectively, an adequate level of original learning must be achieved in the initial learning scenario. Several studies claim “transfer failure”, which have been attributed to inadequate opportunities for learners to learn in the first place. So, without sufficient original learning, people can erroneously conclude that potentially effective educational programs are unproductive in transfer (Bransford & Schwartz, 1999).

Several factors contribute to individuals’ ability to transfer. The manner in which information is learned impacts consequent transfer. Wertheimer (1959) compared instructional techniques that were based on computational approach (understanding the mathematical formulae) and those based on conceptual approach (understanding the underlying concepts that make up a formulae) to determine the area of parallelograms. His study revealed that the conceptual approach facilitated transfer. Similarly, using concrete examples can also improve
initial learning because they are easy to explain and apply. Learning potentially confusing information or concepts in multiple contexts can help learners avoid interference during the initial phase of learning and thus enhances transfer (Bransford et al. 1990). Metacognition has also been identified to increase transfer. It helps students monitor, regulate, and improve their strategies for learning (Brown, 1978; Flavell, 1976).

Another very important factor that affects transfer among learners is motivation. The significance of motivation in resulting transfer changes depending on the type of transfer. Salomon and Perkins (1989) suggested that there are two kinds of transfer, high-road and low-road. Low-road transfer typically elicits well-practiced routines using a stimulus similar to the learning context. Therefore, low-road transfer depends on habit more than motivation and occurs automatically. Contrarily, high-road transfer requires effortful abstraction and needs the learner to look for connections. It demands extended cognitive effort and thus heavily depends on motivation. The present study used instruments intended to incite high road transfer and studied motivational factors that could possibly influence transfer. More specifically, the motivational framework used was that of Subjective Task Value beliefs (expectancy-value theory) of learners and how they influence transfer.

The role of motivation in transfer of learning has also been described in a comprehensive manner by Perkins and Salomon (2012) in a three-part motivation based model of transfer. There are three mental bridges: detect, elect, and connect (defined subsequently in the present paper), that the learners need to build on any occasion of transfer, but they are not necessarily built the same way every time. These three bridges can occur sequentially but may also occur simultaneously in some instances, where the learners might not be aware of the process. Therefore, a great deal of transfer occurs automatically.
Since each of these bridges are important for transfer, the present study will discuss each in detail to identify their significance in the current model.

**Connecting**

Saloman and Perkins (1989) explained that this bridge urges the learner to find a relevant relationship between initial learning and the transfer situation, while detect and elect are taken care of in the process. To be able to achieve this goal, a deep understanding of the original (initial) learning context is very important, which then takes the form of schemas (representations of the respective information). These schemas are then coordinated with novel situations to constitute two different types of transfer: routine transfer (straightforward application) and adaptive transfer (source schemas and target situation are considerably reconstructed to form a relationship). So, in scenarios like these when failure to transfer occurs, it can partly be attributed to initial learning that was superficial in nature.

**Detecting**

Detecting is “discerning the possibility of a connection” between a learned concept and a novel situation (Perkins & Salomon, 2012). Bransford, Franks, Vye, and Sherwood (1989) discussed “inert knowledge” where the knowledge after being learned and comprehended can still be inert and can remain dormant in related contexts. In an experiment, students studied concepts such as solar powered airplanes, water as standard of density, etc. One of the groups studied the information without any context for its application, while the other group learned keeping in mind the idea of a jungle journey (expedition) that they were expected to apply the information to. Afterward, both groups were asked to plan a desert expedition (novel problem). Although both groups performed the same on retention tests, the group that learned in a more active context put the information to better use while planning their desert expedition. This
concept neatly ties into Eccles’ (2005) idea of utility value of a task in fulfilling one’s goal. The subjects in the expedition group performed better on the novel task (desert expedition) because they recognized the significance of the information in completing their expedition.

**Electing**

Electing involves choosing to follow a possible connection. Although all three of the bridges demand some level of motivational investment, elect takes on a much more important status as a crucial stage where learners either cross over to the other side and successfully transfer information into a novel context or they turn aside. Engle et al. (2012) suggested that expansive framing (when learners are taught that they will continue to use the knowledge they gain) can prove very helpful by making learning much more meaningful across different contexts and therefore can help get more attention from learners. An example would be the issue of meaninglessness in case of mathematical lessons. Students often end up viewing mathematics as a bunch of rituals, with no or little practical importance or use. Schwartz et al. (2012) discussed Chase’s (2011) work that pointed out how 50% of the variance in learning can be attributed to quitting after failure. So, the simple act of disengagement after failure led to the elimination of opportunities to transfer learning. Instances like these are a testament that learning should be meaningful, practical, and should foster productive persistence. It can also be deduced based on these studies that the subjective values learners attach to their learning experiences can help them transfer the information better into novel situations.

There are many studies that have looked at role of subjective task value in transfer of knowledge in training contexts (Belenky & Nokes-Malach, 2012; Noe, 1986; Clark et al., 1993) but very few studies have been done in academic settings where the learners might not readily understand the relevance of the information in different settings. Majority of such research
studies have studied the role of motivation in transfer in a unidimensional manner and without any clear reference to the motivation theories. Gegenfurtner et al., (2009a, b) reviewed 31 studies published from 1986 to 2008. The study pointed out that although there are many well-established motivation theories in the literature that provide a multifactorial view of the role of motivation in learning, previous research studies have continued to offer a very unidimensional construct of motivation to transfer in their investigations. The underlying reason for such one-dimensional approach is that these studies barely refer to theories of motivation. Therefore, I think it is important to consider this gap caused by the lack of theoretically guided research when studying motivation and its impact on transfer.

Hence, the present study will look at transfer using the four factors from Eccles subjective task value theory. The theory is based on the idea that the relative significance of different aspects of a task varies across developmental processes as internalization, life stage, and maturation. So, individuals’ preferences and their performance while choosing a task (which can be a course, a topic, an activity, a training program etc.) or certain aspects of a task will depend on their expectation for success on the task and their sense of self-efficacy regarding the accomplishment of the task, the role the task will play in their long and short term goals, social identity and psychological needs, their role schemas and the potential cost of engaging in that task. Together these elements determine whether people chose certain tasks and how much effort they devoted to their completion.

As Feather (1988,1992) explained, task value is the characteristic of a task that either increases or decreases the probability of the task to be selected by an individual/learner. The subjective value of a task can be determined using the following four components:
1. Attainment value: Personal importance associated with performing well on or participating in a task

2. Intrinsic or interest value: Enjoyment individual feels as result of engaging in a task

3. Utility value: The significance of a task in the completion of an individual’s short or long term goals

4. Perceived cost: The cost of engaging in a task

As discussed above, performing well on a test of well-practiced content does not always translate to good performance on a test of transfer (Thorndike & Woodworth, 1901). So, the first objective of this study is to separate these two from each other. I also discussed above that the learners’ ability to transfer something effectively involves an adequate level of original learning that must be achieved in the initial learning scenario (lecture in this case) (Bransford & Shwartz, 1999). Therefore, the present study first used a test that measured the learners’ fundamental understanding of the subject matter taught in the respective lecture. This was followed by a test of transfer that measured the learners’ ability to apply the information they learned during lecture to novel items.

Moreover, the present study investigated the possible impact of the subjective task value of the course on the transfer of information into novel contexts. In the past, most of the research that has studied transfer in relation to motivation has been in areas such as trainees in occupational health, training and its application in workplace, role of motivation in second language acquisition, subjective values of learners in their postdoctoral trainings, adolescents’ subjective values etc. (Cheng & Ho, 2001; Gegenfurtner, 2013; Gegenfurtner, 2011; Belenky & Nokes-Malach, 2012). The proposition here is that most of these studies have been conducted with populations that are either in professional settings or are K-12 students. A handful of studies
(related to subjective values and transfer) have used college students as their population. My interest in this populations arises from the notion that college students are usually at a very crucial point in their careers where they are ready to choose a more focused area of study while they probably still do not have a lot of professional experience. Therefore, it is likely that they perceive the importance of what they learn in classrooms differently than the two aforementioned populations.

The present study also extends the scope of research on subjective values and transfer, to the domain of educational psychology. I have done this by assessing the learners’ understanding of *cognitive development theories* in an educational psychology course through a test of fundamental knowledge followed by a test of transfer. A questionnaire for assessing the learners’ subjective value beliefs was used in this study. So, the main question the present study sought to answer was, “Do learners’ subjective values of a course/or a task within the course correlate with the level of transfer they demonstrate while answering isomorphic questions (superficially different with similar underlying principle)?”. Based on the literature discussed so far it is hypothesized that, if the subjective value of a task has a role to play in the level of transfer learners display, there will be a strong correlation between their scores on the subjective task value instrument and transfer test.

**Methods**

**Participants**

Participants were 45 students enrolled in an educational psychology course who consented to participate in the study. A site authorization letter was obtained from the instructor to access the students enrolled in the abovementioned course at a south-western university for data collection. The recruitment process involved handing out packets including three
instruments and the consent form to all the students in the course. The three instruments included in the packet were as follows: a modified version of Battle and Wigfield’s (2003) Valuing of Education (VOE) Scale with some items from the 40-Item Postgraduate Training Value Instrument within Theoretical Domains instrument (Hagemeier & Murawski, 2014); the Fundamental Understanding Test; and the transfer test.

This was followed by a brief description of what the packets were. The packets were handed out regardless of whether the students wanted to participate or not. The participants were also told that their participation was voluntary and that they could choose to opt out at any time. Anyone who wished not to be a part of the study was simply asked to return their packets to the facilitator. Those who were willing to participate were asked to complete the consent forms and instruments. Consenting and completing the instruments altogether took approximately 10-20 minutes. These consent forms were detached from the packet to de-identify the data and were stored in the Education building in a locked cabinet.

Materials

Materials used in the present study included three instruments: a modified version of Battle and Wigfield’s (2003) Valuing of Education (VOE) Scale with some items from the 40-Item Postgraduate Training Value Instrument within Theoretical Domains instrument (Hagemeier & Murawski, 2014); the Fundamental Understanding Test; and the transfer test. In the present study, the Valuing of Education (Battle & Wigfield, 2003) instrument’s adaptation will be referred to as the Subjective Task Value (STV) Instrument. This instrument has four constructs namely, attainment value, intrinsic or interest value, utility value, and perceived cost. Perceived cost was not a part of the original Battle and Wigfield (2003) Valuing of Education Instrument but was included in the “40-Item Postgraduate Training Value Instrument within
Theoretical Domains” instrument (Hagemeier & Murawski, 2014). The Subjective Task Value (STV) Instrument altogether contains seventeen items, where each of the constructs had four items except attainment value which had five items (See appendix A). The instruments asked participants to rate their response to each item on a scale 1 to 5 (Strongly Disagree=1, Disagree=2, Neutral=3, Agree=4, Strongly Agree=5). Item 15 and 17 were reverse coded due to wording. Reliability analyses showed that the instrument consistently measured different constituents of task value, with a Cronbach alpha of $\alpha=.90$.

The latter two instruments (the Fundamental Understanding Test, and the transfer test) were created by the researcher. These two measures were based on the “two-problems” transfer paradigm described by Perkins and Salomon (2012) where the participants used the ‘behavioral theories’ they learned in class to tackle one problem (case) with characteristics close to the learning situation (fundamental Understanding test). Then the learners were faced with another problem (case) that had different superficial features but the same deep structure. The students used cognitive behavioral theories they learned earlier during lecture to interpret these two cases. Following is an example of an item from the fundamental Understanding test with an isomorphic problem from transfer test respectively:

The distance between where a learner is as an independent learner and where he/she can get with adult guidance, is called ________________.

a. scaffolding
b. zone of proximal development
c. reciprocal teaching
d. self-regulated learning
Eliza tries to solve her first puzzle but does poorly. So, her father explains some basic strategies to her such as, beginning the puzzle with the corner pieces and helps her put together a few pieces and encourages her when she successfully does so. The father slowly withdraws his assistance as Eliza gets better and better at the task. The area Eliza was in initially without her father’s help is called ______________.

a. self-regulated learning  
b. scaffolding  
c. reciprocal teaching  
d. zone of proximal development

The fundamental understanding test (FUT) had 9 items where each item on the FUT corresponded to an isomorphic item on the transfer test (TT). The transfer test had a total of 9 items. The items on both tests were multiple choice questions related to the cognitive development theories they had studied in class (See Appendix B and C). The correct responses were coded as 1 and the incorrect responses were coded as 0 for both of these tests. The reliability analyses showed that both instruments had an acceptable reliability (considering that the construct represented by both the instruments was not too broad) with a Cronbach alpha of \( \alpha = .62 \) (\( FUT \)) and \( \alpha = .58 \) (\( TT \)). Two academicians with expertise in educational psychology (specifically learning theories) reviewed all the instruments for face and content validity. The recommended changes were incorporated into and approved for the final versions of the instruments.

**Procedure**

The present study included a test of fundamental understanding and a test of transfer. These two tests were preceded by the Subjective Task Value (STV) instrument to measure the subjective value of cognitive development theories. The data collection was carried out at the
end of one of the lectures after a month of the topic (cognitive development theories) being taught. All of the students enrolled in the class and present on the day of the data collection were given a packet comprised of consent form, the STV instrument, the Fundamental Understanding Test, and the transfer test. Each instrument in each packet had a serial number for each participant. The students were asked to read the consent forms and sign them if they were willing to participate in the study. These consent forms were later detached from the packet for de-identifying the data and were stored safely in the education building in a locked cabinet. Students who were not interested in participating were asked to simply return their packets to the researcher. Those who were willing to participate completed the Subjective Task Value Instrument, the fundamental understanding test, and the transfer test. This was followed by the completion of the fundamental understanding test and the transfer test. Altogether, these instruments took 15-20 minutes to complete.

Results

Results showed that the regression equation with the subjective task value measure was nonsignificant, $R^2=.003$, $F (1,43) =.15$, $p=.70$. The coefficient values also showed that when it came to transfer, subjective values ($\beta=.01$, $p=.92$) learners attached to the cognitive development theories did not significantly predict their ability to transfer these theories into a novel context (isomorphic questions). Nonetheless, fundamental understanding was significantly related to the participants’ performance on the transfer test, $R^2=.33$, $F (2,42) =10.50$, $p<.05$. This implies that using both predictors the correlation is significantly greater than zero. Additionally, a stepwise regression analysis resulted in coefficient values that showed that fundamental understanding ($\beta=.58$, $p<.05$) is a significant predictor of transfer.
The descriptive statistics for the FUT ($M=6.27$, $SD=2.03$) and for TT ($M=4.33$, $SD=2.07$) indicated an overall low performance on both tests. Relative to the TT, participants answered more questions correctly on the FUT but the large standard deviation shows that the sample scores varied a lot, implying that the overall performance was not very good. Compared to FUT, the participants scored lower on the TT test. Table 1 shows the means and standard deviations for each of the items on FUT and TT. On FUT item 1, 2, 4, and 7 seemed particularly problematic with the lowest means and highest variabilities. On transfer test, most of the items looked problematic with the exception of items 3, 4, and 5 that had relatively higher means and SD values were not too large. Items that the participants had difficulty responding correctly to on both the FUT and TT were item 1, 2, and 7. Evidently each of these items have low means and fairly high standard deviations. For item 4 we saw a boost in performance on the transfer test with a low mean score on FUT followed by higher mean score on TT. Item 6, 8, and 9 showed a sizeable decrease in the mean score from FUT to TT.

Table 1

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean FUT</th>
<th>SD FUT</th>
<th>Mean TT</th>
<th>SD TT</th>
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<tbody>
<tr>
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<td>Q2</td>
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<td>Q4</td>
<td>.56</td>
<td>.503</td>
<td>.62</td>
<td>.490</td>
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<td>Q5</td>
<td>.78</td>
<td>.420</td>
<td>.67</td>
<td>.477</td>
</tr>
<tr>
<td>Q6</td>
<td>.87</td>
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<td>Q9</td>
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</table>
For the STV scale the internal consistency for each of the constructs was: $\alpha = .87$ for intrinsic value; $\alpha = .83$ for attainment value; $\alpha = .80$ for utility value; and $\alpha = .22$ for perceived cost. This shows that the participants’ responses were consistent across items related to each construct with an exception of perceived cost, which had a relatively lower reliability. Further, attainment value ($M=19.47$, $SD=3.39$) had a significantly higher mean score than intrinsic value ($M=15.84$, $SD=2.61$) or utility value ($M=15.09$, $SD=2.99$). Perceived cost ($M=14.47$, $SD=2.22$) had the lowest mean score out of all the constructs. Furthermore, the scores from all items on the STV instrument were averaged and the resulting statistics were, $M=64.87$, $SD=9.81$.

Two multiple regression analyses were conducted to predict the relationship each of the independent variables (subjective task values and fundamental understanding) have with the dependent variable (transfer). The first analysis was to study whether subjective values ascribed to the cognitive development theories would predict the participants’ ability to transfer the knowledge gained through study of the respective theories. The regression equation with the subjective task value measures was nonsignificant, $R^2=.003$, $F (1,43) =.15$, $p=.70$. This means that only .34% of the variation in the learners’ ability to transfer the knowledge is attributed to the subjective values the learners ascribed to the said theories. The coefficient values also showed that when it came to transfer, subjective values ($\beta=.01$, $p=.92$) learners attached to the cognitive development theories were not significant predictors of their ability to transfer these theories into a novel context (isomorphic questions).

The second regression analysis was conducted with both subjective task values and fundamental understanding as predictors of participants’ transfer of the cognitive development theories. The linear combination of the two independent variables was significantly related to the
participants’ performance on the transfer test, \( R^2 = .33, F (2,42) = 10.50, p < .05 \). This implies that using both predictors the correlation is significantly greater than zero. Thirty-three percent of the variation in the learners’ ability to transfer the knowledge gained by studying the cognitive development theories is explained by the learners’ fundamental understanding and subjective values of these theories.

Additionally, coefficient values resulting from a stepwise regression analysis showed that fundamental understanding (\( \beta = .58, p < .05 \)) is a significant predictor of transfer. Based on these results, we can conclude that a deeper fundamental understanding of the cognitive development theories appears to offer a better predictive power of the learners’ ability to transfer knowledge learned through the study of cognitive development theories than that contributed by the subjective values learners ascribe to these theories.

**Discussion**

The present study looked at the possible relationship between learners’ value beliefs about cognitive development theories and their ability to transfer knowledge learned from the study of these theories. As discussed earlier, getting an impartial and complete picture of learners’ ability to transfer involves considering whether the learners have achieved a significant level of fundamental understanding of the respective content. Hence, my regression analysis comprised of two steps: 1. Conducting a regression analysis initially with the principle independent variable (STV) only. 2. Then conducting another regression analysis holding the confounding variable (fundamental understanding) constant. The findings showed that there is no significant relationship between learners’ value beliefs and their transfer of knowledge into a novel context that requires more conscious deliberation. However, as expected, fundamental
understanding of the cognitive development theories significantly predicted the learners’ transfer of the knowledge into novel context.

Considering the existing literature, the likely outcome was that the valence of different activities would influence the value beliefs attached to them by the individual, which in turn would drive their actions (Feather, 1982). These subjective task values are typically said to have motivational consequences, such as approaching or avoiding an activity or a task. This same line of reasoning has been recognized by Lewin (Lewin, 1938). So, typically if learners felt that learning the cognitive development theories is intrinsically enjoyable, useful, worthy of their effort/time, and has personal significance then this will naturally guide their actions. They will perhaps be more vigilant when listening to the lectures, more likely to devote time to studying these theories, more apt to try to spot the underlying principles when solving transfer problems, and so on. However, the present study showed that individuals’ value beliefs do not influence their ability to transfer. In other words, the results imply that individuals’ who expressed positive value beliefs towards the cognitive development theories did not perform any differently on the transfer tasks than those who did not have positive value beliefs. Fundamental understanding on the other hand did have a relationship with the learners’ ability to transfer. Learners who had achieved a deeper initial understanding of the theories were able to transfer that knowledge to the novel items on the transfer tests.

Nonetheless, the high mean scores on the subjective task value instrument tell that most of the learners had positive value beliefs regarding the cognitive development theories but this still was not predictive of their ability to transfer the knowledge. This lapse between the learners’ value beliefs and transfer might be attributable to the fact that the tests were administered almost a month after the theories were taught in class. The students’ poor performance on both of the
tests could be due to the delay between the initial instruction and the test administration. Spacing these two events out so much might have simply interfered with their retention of the information, which could also influence transfer.

Another explanation for the low performance on transfer of knowledge learned through the study of cognitive development theories despite having positive value beliefs might be because cognitive development theories were only a small portion of the course. This might have caused the value beliefs related to the cognitive development theories to have an insignificant interaction with their tendency to transfer the knowledge. To conduct a comparison, it would be interesting to study the potential relationship between individuals’ value beliefs regarding a whole course (instead of just a theory) and their ability to transfer.

Nonetheless, since fundamental understanding was significantly correlated with transfer, it can be deduced that the learners were able to transfer a significant proportion of the knowledge to the novel items on the transfer test but this transfer was simply not influenced by their value beliefs. In other words, students who had positive value beliefs regarding the theories did not perform any differently from those who did not have positive value beliefs about the theories. As the descriptive statistics showed, there was a considerable decline in correct responses on the transfer test in comparison to the FUT on the corresponding items. This lapse in correctly answering some of the isomorphic problems on the TT is indicative that the participants were struggling with the same concepts when it came to transfer. Since I had measured fundamental understanding, it also suggests that the lapse in transfer was not due to insufficient initial understanding of the concept in question.

An important aspect of the results that needs attention is that the participants were partially unable to transfer the concepts to the novel problems despite performing relatively
better on the fundamental understanding test. This lapse of transfer might be explained by a
deeper look at the manner of instruction in the future. More specifically, whether the leaners’
attention was drawn to available skills that could be used to solve such novel problems
highlighting the potential for transfer during instruction. Past research has shown an increase in
transfer only by hinting the learners to use the previous models to solve the transfer problems
(Gick & Holyoak, 1980). So, any type of clues that could signal a possible connection between
two seemingly unrelated concepts could make individuals more mindful of such opportunities.
These clues could be things as simple as pointing out the relevance of a certain concept or
available skill to an upcoming task/situation. Similarly, there are other studies that suggest that
the learners should be provided with many examples that endorse the possibility of transfer
during the instruction phase (Bransford, Franks, Vye, & Sherwood, 1989; Brown & Kane, 1988;
Ghatala, Levin, Pressley & Lodico, 1985; Pressley, Borkowski, & Schneider, 1989). Further
research that provides a deeper look into the instructional techniques used while teaching this
content could give us a clearer picture of whether such examples could lead to a different
outcome.

Also, making these connections is a slow process that we cannot expect learners to
master in one go. As Anderson, Reder, and Simon (p. 7, 1996) pointed out “We do not require
that the students show the benefit of calculus on the first day of physics. Rather we expect them
to be better physics students at year’s end for having had a year’s study of calculus.” It comes as
a limitation of this study that I did not have a measure of possible previous exposure to this
content. For future research, it would be interesting to employ the abovementioned strategies at
the time of instruction and to test the learners’ ability to transfer multiple times at different points
during the semester to see whether time and practice plays a role in their tendency and ability to transfer knowledge to novel problems.

The present study has a few other limitations that, if eliminated in the future, can lead to clearer and more conclusive results. For both the fundamental understanding and transfer test increasing the number of items would likely lead to a more reliable scale. Deleting items 1, 4, 5, 7, and 9 from the FUT increased its alpha coefficient from $\alpha=.62$ to $\alpha=.77$. Beyond that, eliminating any of the four remaining items caused a decrease in the alpha value. Similarly, eliminating items 1, 2, 4, 6, 7, and 9 led to a boost in the alpha value from $\alpha=.58$ to $\alpha=.67$. Eliminating any of the remaining three items caused a decrease in the alpha value. The present study could not incorporate these changes due to time constraint but in the future eliminating these items and adding more items could possibly increase the reliability of these newly created instruments.

Moreover, convenience sampling in the present study might also have played a role in the lack of relationship between the value beliefs and transfer performance of the participants. Since the domain this study focused on was very specific, random sampling was not a feasible option. This might have compromised the representativeness of the sample I used in the present study. The fairly high value findings may be due to those who were already interested in the topic agreeing to participate in research related to it.

**Conclusion**

As discussed in the beginning of the present paper, transfer is usually the ultimate goal of learning. Our capacity to make information we gain in one context useful and applicable in another context is what makes learning and its impact so wide-ranging. Learning that is situated only in its original context eventually becomes obsolete. That is why it is important that we
understand the factors that lead to or hinder transfer. Unlike the existing literature, the present study showed that value beliefs do not have a relationship with individuals’ ability to transfer. If these results hold up after eliminating the limitations we identified previously, this could have important implications for how we view motivational elements and their role in learning. Future research that takes the nature of instruction into account and that test the learners for transfer multiple times during a single semester would perhaps give us a much clearer picture of the determinants of the learners’ failure to transfer.
Appendix A

Participant ID# 3011

An adaptation of Battle and Wigfield’s Valuing of Education (VOE) Scale with items from

40-Item Postgraduate Training Value Instrument within Theoretical Domains

Please complete the questionnaire by rating how much you agree or disagree with the following statements using the given scale.

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrinsic Value</td>
<td>Learning the cognitive development theories is very appealing to me. (^a)</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1 enjoyed advancing my knowledge by exploring these theories. (^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The challenge of learning cognitive development theories is exciting. (^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 enjoyed engaging with the content (i.e. answering questions, discussing with peers, etc.) while the cognitive development theories were being taught in class. (^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attainment Value</td>
<td>The amount of effort it takes to develop a deep understanding of cognitive development theories is worthwhile to me. (^c)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Taken from the VOE original (Battle & Wigfield, 2003)

\(^b\) Taken from “40-Item Postgraduate Training Value Instrument within Theoretical Domains” (Hagemeier & Murawski, 2014)

\(^c\) Taken from (Eccles, O’Neill, & Wigfield, 2005)
## Subjective Task Value and Transfer

### Participant ID# 3011

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly agree (5)</th>
<th>Agree (4)</th>
<th>Neutral (3)</th>
<th>Disagree (2)</th>
<th>Strongly disagree (1)</th>
</tr>
</thead>
</table>
| I feel that being good at answering questions which are based on concepts related to cognitive development theories is important to me.  
\(^c\)                                                                         |                    |           |             |              |                       |
| It is important to me to perform well on the questions related to cognitive development theories on my exam(s).  
\(^a\)                                                                         |                    |           |             |              |                       |
| Understanding these theories was important in allowing me to show that I was competent.  
\(^b\)                                                                         |                    |           |             |              |                       |
| This course is of great personal value to me.  
\(^a\)                                                                         |                    |           |             |              |                       |
| Utility Value                                                                 |                    |           |             |              |                       |
| The concepts I learned while studying cognitive development theories will be useful to me in the completion of my future goals (such as, degree completion, being efficient at work, etc.)  
\(^a\)                                                                         |                    |           |             |              |                       |

\(^a\) Taken from the VOE original (Battle & Wigfield, 2003)

\(^b\) Taken from “40-Item Postgraduate Training Value Instrument within Theoretical Domains” (Hagemeier & Murawski, 2014)

\(^c\) Taken from (Eccles, O’Neill, & Wigfield, 2005)
### Participant ID# 3011

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The concepts I learned while studying cognitive development theories will be useful to me in my daily life outside college. a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I was interested in studying these theories because they are required for certain career paths that I want to pursue. b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Studying and understanding these theories was necessary for me to differentiate myself from others. b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Perceived Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I get anxious when I don’t completely understand the concepts taught under cognitive development theories. Created by author to represent emotional cost</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I worry that spending time studying cognitive development theories would take time away from other activities I wanted to pursue. c</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Taken from the VOE original (Battle & Wigfield, 2003)

b Taken from “40-Item Postgraduate Training Value Instrument within Theoretical Domains” (Hagemeyer & Murawski, 2014)

c Taken from (Eccles, O’Neill, & Wigfield, 2005)
### Participant ID# 3011

<table>
<thead>
<tr>
<th>Items</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning cognitive development theories was worth it regardless of all the work required to understand the theories. (^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I worried that I would waste a lot of time and money before I found out that this topic was of no value to me. (^a)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Taken from the VOE original (Battle & Wigfield, 2003)

\(^b\) Taken from “40-Item Postgraduate Training Value Instrument within Theoretical Domains” (Hagemeier & Murawski, 2014)

\(^c\) Taken from (Eccles, O’Neill, & Wigfield, 2005)
Appendix B

Participant ID# 3011

Fundamental Understanding Test
Cognitive Development Theories

Please, complete the test by choosing the best/correct answer.

1. According to Piaget, at which of the following stages children are able to apply logical thought to physical objects but not to abstract (hypothetical) concepts.
   a. Pre-operational stage
   b. Concrete operational stage
   c. Formal operational stage
   d. Sensorimotor stage

2. The process that enables children to integrate already existing schemata with the new information they receive in their daily life.
   a. Equilibrium
   b. Assimilation
   c. Symbolic thought
   d. Conservation

3. Children’s inability to perceive the world from others’ perspective is what Piaget called
   __________.
   a. egocentrism
   b. zone of proximal development
   c. symbolic thought
   d. intuitive thought

4. __________ believed that cognitive development leads to development of language among children, and not vice versa.
   a. Pavlov
   b. Piaget
   c. Watson
   d. Freud
Participant ID# 3011

5. According to ____________, language is an essential mechanism for thinking, cultural transmission and self-regulation. It also qualitatively raises the level of intellectual functioning.
   a. Piaget
   b. Vygotsky
   c. Pavlov
   d. Freud

6. The distance between where a learner is as an independent learner and where he/she can get with adult guidance, is called ____________.
   a. scaffolding
   b. zone of proximal development
   c. reciprocal teaching
   d. self-regulated learning

7. During transition to the pre-operational stage, children start to visualize things that are not physically present based on their mental representations. This is called ____________.
   a. object permanence
   b. conservation
   c. intuitive thought
   d. accommodation

8. When an existing schema is altered to deal with an inconsistent incoming object or situation, it is called ____________.
   a. assimilation
   b. accommodation
   c. object permanence
   d. equilibrium
Participant ID# 3011

9. _______________ is the process where the adult controls the elements of a task that a learner cannot perform initially without assistance, which allows him/her to focus on and complete the elements that are within his/her range of competence.
   a. Scaffolding
   b. Peer collaboration
   c. Reciprocal teaching
   d. Social support
Appendix C

Participant ID# 3011

Transfer Instrument
Cognitive Development Theories

Please, complete the test by choosing the best/correct answer.

1. Hammie is incapable of understanding his mom’s underlying message, when she tells him to get in the tub, implying that he should take a bath. This stage is called ______________.
   a. pre-operational stage
   b. formal operational stage
   c. concrete operational stage
   d. sensorimotor stage

2. Which of the following enables Sarah to integrate the already existing schema of a horse with the new information she has received in class to conclude that the striped animal is a zebra?
   a. Accommodation
   b. Assimilation
   c. Object permanence
   d. Conservation
Participant ID# 3011

3. Poncho’s inability to perceive this situation from the cat’s perspective characterizes which key feature of the preoperational stage of cognitive development?
   a. Zone of proximal development
   b. Symbolic thought
   c. Intuitive thought
   d. Egoceentrism

4. Out of the above two people, ________ would most likely agree with the lady because…
   a. Vygotsky…her thoughts are guided by her speech.
   b. Skinner…she thinks that she will be rewarded for her compliance.
   c. Pavlov…she seems to think that her correct repetition of the words will result in reinforcements.
   d. Piaget…she seems to believe that her thoughts are not necessarily guided by language.
Participant ID# 3011

5. *While playing with his tinkertoy David engages in the following monologue (observer sitting across the room on at a desk):* “The wheels go here, the wheels go here. Oh, we need to start it all over again. We need to close it up. See, it closes up. We're starting it all over again. Do you know why we wanted to do that? Because I needed it to go a different way. Isn't it going to be pretty clever, don't you think? But we have to cover up the motor just like a real car.”

Considering Vygotsky ideas, choose the best answer.

a. David is talking to himself because he lacks the intent to communicate in a social way.
b. He does not want to consider views of the listener, which is why he is using speech to distance the listener.
c. Unlike older children and adults, he cannot think in a completely covert manner, which is why he is expressing such self-guidance through speech.
d. David is talking to himself because he lacks the cognitive ability to be aware of the observer’s views.

6. Eliza tries to solve her first puzzle but does poorly. So, her father explains some basic strategies to her such as, beginning the puzzle with the corner pieces and helps her put together a few pieces and encourages her when she successfully does so. The father slowly withdraws his assistance as Eliza gets better and better at the task. The area Eliza was in initially without her father’s help is called ____________.

a. self-regulated learning  
b. scaffolding  
c. reciprocal teaching  
d. zone of proximal development
Participant ID# 3011

7. This is an example of the cognitive milestone called _________ that children reach at the end of their sensorimotor stage of development.
   a. conservation
   b. object permanence
   c. accommodation
   d. assimilation

8. If Calvin’s mom explained to him that a toaster is used to make toast out of bread, it will cause a change in his schema of a bread. Thus, helping him achieve ___________.
   a. symbolic thought
   b. accommodation
   c. object permanence
   d. conservation
Participant ID# 3011

9. Tom wants to bake a cake for his sister’s birthday but he does not know how to bake. So, his mom decides to help him by providing him appropriate assistance so that he can complete the task. This is called __________.
   a. peer collaboration
   b. reciprocal teaching
   c. social support
   d. scaffolding
References


