



Copyright © 2018 by Academic Publishing  
House Researcher s.r.o.  
All rights reserved.  
Published in the Slovak Republic  
European Journal of Contemporary Education  
E-ISSN 2305-6746  
2018, 7(3): 531-540  
DOI: 10.13187/ejced.2018.3.531  
[www.ejournal1.com](http://www.ejournal1.com)

**WARNING!** Article copyright. Copying, reproduction, distribution, republication (in whole or in part), or otherwise commercial use of the violation of the author(s) rights will be pursued on the basis of international legislation. Using the hyperlinks to the article is not considered a violation of copyright.



## Investigation of the Relationship between Teaching and Learning Conceptions and Epistemological Beliefs among Student Teachers from Hashemite University in Jordan

Ahmad M. Mahasneh <sup>a, \*</sup>

<sup>a</sup> Hashemite University, Jordan

### Abstract

This study aimed to analyzing the relationship between student teachers teaching and learning conceptions and epistemological beliefs. The study sample is composed of 250 undergraduate student teachers attending the faculty of Educational Science. The Conceptions of Teaching and Learning Questionnaire (CTLQ) and Epistemological Beliefs Scale (EBS) were the sources of data collection. The study results showed significant gender-based differences in teaching and learning conceptions based on student teachers' gender. A significant relationship was also found between student teachers' teaching and learning conceptions and their epistemological beliefs.

**Keywords:** teaching and learning conceptions, epistemological beliefs, student teachers.

### 1. Introduction

Gaining an insight into the learning and teaching conceptions held by teachers may well be of interest to both teachers and educational institutions. Since the teachers' conceptions are not wholly the result of conscious decisions, encouraging them to reflect deeply may trigger responses engendering modification of the conceptions (Ho; Watkins, Kelly, 2001). From the institute's perspective, such an overview could be a valuable data resource if, for instance, curricula were under review and likely to become more student-centered. Teachers' conceptions of teaching and learning are defined by Chan and Elliott (2004) as "the beliefs held by teachers about their preferred ways of teaching and learning" (p. 819) including what teaching and learning actually mean, and the teacher-pupil relationship.

The two distinct and opposing conceptions in teaching and learning are known as the traditional and the constructive, the traditional conception being based on teacher-centered methods where he/she is the knowledge source and the student merely the passive recipient.

---

\* Corresponding author

E-mail addresses: [dahmadmahasneh1975@yahoo.com](mailto:dahmadmahasneh1975@yahoo.com) (A.M. Mahasneh)

The theories propounded by Piaget and Vygotsky form the basis of the Constructivist conception, which is diametrically opposed to the Traditional, in stressing the significance and value of active, practical experience and participation by the learner in his/her knowledge-building, and the positive impact of a child's interaction with peers or adults is stressed by both Vygotsky and Miller (1997).

Therefore, the basic tenets of constructivism are as follows: the child is not a passive recipient of knowledge, but an active participant in his/her knowledge-building, physically and intellectually, contributing meaningfully and positively by assimilating and incorporating new knowledge with that already held. According to Clements and Battista (1990), each individual's conception of the world is inevitably based on his/her childhood environment, social interaction, and life experiences, which all contribute to the view of learning as a social process whereby the child's intellectual growth may be either stimulated or stunted by the intellectual environment. This is in direct contrast to constructivism, which is centered on developing critical thinking and an ethos of cooperation and teamwork, where the learning environment is stimulating and pro-active (Chan, Elliot, 2004; Cheng et al., 2009).

There is an abundance of literature examining the various ways in which teachers and students view learning, the studies undertaken for a variety of reasons and purposes, but according to Chan, Tan, and Khoo (2007), Meirink, Meijer, Verloop, and Bergen (2009), Saban (2003), Saban, Kocbecker, and Saban (2007), many are conducted on the basic premise that teachers' beliefs regarding teaching and learning conceptions are two distinct subjects which can be considered separately, without the one having any bearing on the other.

The primary focus of studies by Saban (2003) and Saban et al. (2007) for example, is the beliefs held by teachers regarding teaching while relegating their beliefs regarding learning to a mere offshoot of the research.

On the other hand, the deep layers of teacher cognition have become the focus of abundant studies oriented toward its psychological aspects, initially investigating the epistemological beliefs of teachers and correlating them with the teachers' actual teaching behavior, which is revealed in many studies to be their prime concern (Chai et al., 2009; Hofer, Pintrich, 1997; Maggioni, Parkinson, 2008; Wong et al., 2009). However, as noted by Hofer and Pintrich (1997) our understanding of students' and teachers' beliefs, thoughts, and thinking about knowledge will be advanced by exploration of developing epistemological theories, which aid greater comprehension of the complex process of teaching and learning in classrooms.

Researchers have long been aware of the popularity of student teachers' conceptions of learning and teaching as a study topic, due in no small measure to its impact on not only learning strategies and outcomes, but also on students' motivation. Studies by Pillay, Purdie & Boulton-Lewis (2000), Purdie and Hattie (2002), Purdie, Hattie and Douglas (1996), also illustrate the effect of these conceptions on learning outcome quality.

Another popular topic creating an abundance of studies is the exploration of consistency between teachers' approaches to teaching and their teaching and learning conceptions (Chan et al., 2007; Hewson, Kerby, 1993; Koballa et al., 2005) while other researchers have identified specific attributes attached to these conceptions such as being nested (Koballa et al., 2000; Tsai, 2002), culture dependent (Chan et al., 2007; Tsai, 2004), domain-specific (Eren, 2009; Tsai, 2004), and suggested relationships including those with epistemological beliefs (Chan, Elliott, 2004; Otting et al., 2010) and self-efficacy beliefs (Eren, 2009).

A number of cognitive variables can impact the processes of both teaching and learning, among the most important of which are epistemological beliefs and teaching and learning conceptions. Epistemological beliefs are defined as expressions of belief in the nature of knowledge and its acquisition or learning. A definition of personal epistemological belief is given by Schommer, who describes it as a five-dimensional system (knowledge organization, certainty of knowledge, source of knowledge, control and speed of knowledge acquisition) whereby each dimension may be used individually or in combination, with these beliefs exerting a strong influence on both individual and general cognitive and meta-cognitive thought processes (Schommer, 1990, 1994).

According to Chan and Elliot (2004), Cheng, Chan, Tang and Cheng (2009), recent studies have illustrated a mutual effect between epistemological beliefs and teaching and learning conceptions, whereby each is influenced by the other. As explained by Schommer (1990, 1994),

epistemological beliefs can be regarded as individual traits, since they reflect a person's particularities relating to the nature and acquisition of knowledge. While Hofer (2001) regards epistemological beliefs as comprising the following when defining knowledge: its construction, method of evaluation, where it is based, and how it transpires.

Although epistemological beliefs may be considered a unit or entity, they do at the same time comprise a belief system with five independent dimensions, including such as: the source of knowledge, its structure/organization, its stability, and speed and control of learning (Schommer, 1990) notes that the differing individual levels of epistemological beliefs are related to the individual's level of sophistication, worldliness, educational background etc., therefore an educated person is more likely to believe that knowledge is neither certain nor absolute, that it is neither perfect nor complete, that an unknown mass has yet to be discovered, and that only a small portion of it is constant. Such individuals will naturally bring a critical approach to what they read, whereas the epistemological beliefs of those from a more limited background will be naïve, believing most knowledge to be assured and constant, that some knowledge will be of recent discovery, but that the main body of knowledge is immutable, consequently these individuals are credulous and gullible, believing and being influenced by whatever they read (Aypay, 2011a; 2011b; Deryakulu, 2002; Schommer, 1990, 1994).

Schommer (1990) purport that the differences in individuals' epistemological beliefs will therefore impact their success and achievement particularly in the academic field, since those with a background in critical thinking and evaluation of knowledge, familiar with time-management, prioritizing, and other learning/study strategies will be more aware of the extent to which they are absorbing and understanding the new knowledge.

A number of researchers including Brownlee, Purdie & Boulton-Lewis, (2001), Hofer and Pintrich (1997), Tolhurst (2007), pinpoint the ways in which epistemological beliefs influence variables, such as individuals' methods of handling the new knowledge, levels of comprehension, interpretation, use of inference and deduction, study strategy choices, thought processes and problem-solving, and the time and effort expended in learning. Additionally, Hofer and Pintrich, (1997, 2002), provide insight into epistemological beliefs as a branch of philosophy dedicated to exploring the spectrum of human knowledge, its origin, nature, methods and limits. The importance of these beliefs lies in their broad sphere of influence, since they are core values or concepts whose function is associated with the majority of beliefs and knowledge. In his study, Perry (1970) presents the hypothesis that during development of students' epistemological beliefs, they progress through definite strata: (1) dualism, (2) multiplism, (3) relativism, and (4) commitment. Schommer (1994) presented an expansion of Perry's work and illustrated four dimensions within four perspectives of epistemological beliefs, ranging between naïve and sophisticated.

The beliefs of higher-scale, sophisticated learners accept that a minimal amount of knowledge is invariable, some knowledge is yet to be revealed, and an immense body of knowledge is evolving. These beliefs are in direct contrast to those of naïve learners, that an immense body of information is certain, some knowledge remains to be discovered, and a minimal amount of knowledge is changing.

The purpose of the present research is to perform an analysis of the correlations between student teachers' epistemological beliefs and their teaching and learning conceptions in the Jordanian higher education context.

### **Study questions**

This study aimed to answer the following questions:

*Question One:* What are the teaching and learning conceptions and epistemological beliefs held by the student teachers?

*Question Two:* Are there any significant differences in teaching and learning conceptions of student teachers based on gender?

*Question Three:* Is there a significant relationship between teaching and learning conceptions and epistemological beliefs?

## 2. Study Methodology

### Participants

The participants consisted of 250 student teachers at the Faculty of Educational Science, Hashemite University. Of the participants, 66 were male (26.4 %) and 184 female (73.6 %). Of the student teachers 66 (26.4 %) were first year, 58 (23.2 %) second year, 39 (15.6) third year, and 87 (34.8) fourth year, participants' ages ranging from 18 to 22 years ( $M=20.12$ ;  $SD=2.66$ ).

### Data collection tools

In the current study, two data collection tools were used: Teaching and Learning Conceptions Questionnaire (TLCQ) which was developed by Chan and Elliot (2004), includes 30 items measuring two different conceptions, teaching and learning. The first conception, constructivist method comprises 12 items, and traditional method 18 items. The TLCQ was scored on a five point Likert scale ranging from (1) never to (5) always. Chan and Elliot (2004) calculated that the internal consistency of the questionnaire using Cronbach alpha was 0.84. For the purpose of the current study, the questionnaire was translated into the Arabic language and referred to three faculty members for language accuracy verification. The author calculated that the internal consistency of the questionnaire using Cronbach alpha was 0.85 for constructivist conception, and 0.81 for traditional conception.

The second tool was the Epistemological Beliefs Scale (EBS) which was developed by Chan and Elliot (2004), includes 30 items measuring four subscales for epistemological beliefs (1) innate/fixed ability (13) items, (2) learning effort/process (6) items, (3) authority/expert knowledge (6) items, and (4) certainty knowledge (5) items. The EBS was scored on a five point Likert scale ranging from (1) strongly disagree never to (5) strongly agree. Chan and Elliot (2004) calculated the internal consistency of the instrument using Cronbach alpha was 0.84. For the purpose of the current study the scale was translated into the Arabic language and referred to three faculty members to check for language accuracy. The author calculated the internal consistency of the instrument by using Cronbach alpha was 0.82, 0.85, 0.77, and 0.81 for innate/fixed ability, learning effort/process, authority/expert knowledge, and certainty knowledge respectively.

The participants answer the Teaching and Learning Conceptions Questionnaire (TLCQ) and Epistemological Beliefs Scale (EBS) during approximately 40 minutes of their regular class time.

### Data analysis

The mean and standard deviation for each of the subscales of teaching and learning conceptions and epistemological beliefs were obtained. Independent sample t-test was used to determine whether there are a significant differences in the subscale of teaching and learning conceptions based on gender, the t-test determine whether there is a significant differences between the means in two unrelated groups, the Pearson correlation coefficient was used to determine whether there is a significant relationship among the subscales of teaching and learning conceptions and epistemological beliefs, and multiple regression analysis was used to show the predictability of epistemological beliefs to teaching and learning conceptions. The SPSS (v. 20) was used for all these statistical procedures.

## 3. Results

**Question One:** What are the teaching and learning conceptions and epistemological beliefs held by the student teachers?

To achieve this objective, illustrative statistics including means and standard deviation were used to explain the student teachers teaching and learning conceptions. [Table 1](#) presents means and standard deviation for each dimension.

**Table 1.** Means and standard deviation of teaching and learning conceptions

Dimensions	Means	Standard Deviation
Constructivist Conception	3.43	0.99
Traditional Conception	3.04	0.67

The results showed mean scores of student teachers' teaching and learning conceptions ranging from 3.04 to 3.43. Constructive conception dimensions had the highest mean value (M=3.43, SD= 0.99), followed by traditional conception (M= 3.04, SD=0.67).

To determine the means of each dimensions of epistemological beliefs, Table 2 presents means and standard deviation for each dimension.

**Table 2.** Means and standard deviation of epistemological beliefs

Dimensions	Means	Standard Deviation
Innate/Fixed Ability	2.87	0.57
Learning Effort/Process	3.33	0.83
Authority/Expert Knowledge	2.92	0.63
Certainty Knowledge	3.04	0.86

The means scores and standard deviation were used to explain the student teachers' epistemological beliefs. The results showed that the mean scores of student teachers' epistemological beliefs ranging from 2.87 to 3.33. Learning effort/ process dimensions had the highest mean value (M=3.33, SD=0.83), followed by certainty knowledge (M=3.04, SD=0.86), and then by authority/expert knowledge (M=2.92, SD=0.63). The lowest mean scores wherefore the innate/fixed ability (M=2.87, SD=0.57).

**Question Two:** Are there any significant differences in teaching and learning conceptions of student teachers based on gender?

To determine whether significant differences exist between student teachers' teaching and learning conceptions according to student gender. Table 3 presents t-test, means and standard deviation for each dimension.

**Table 3.** t-test results of teaching and learning conceptions based on gender

Dimensions	Gender	Mean	S.D	t	Sig
Constructivist Conception	Male	2.59	0.87	-9.289	0.00
	Female	3.74	0.84		
Traditional Conception	Male	2.77	0.83	-3.846	0.00
	Female	3.14	0.58		

The results showed significant differences student teachers' gender in teaching and learning conceptions. For the constructive conception dimension, female students' mean score (M=3.74, SD=0.84) was higher than that of male students (M=2.59, SD=0.87), and for the traditional conception dimensions the female students' mean score (M=3.14, SD=0.58) was higher than that of male students (M=2.77, SD=0.83). The t value of the constructivist conception was (-9.298), and the t value of traditional conception was (-3.846).

**Question Three:** Is there a significant relationship between teaching and learning conceptions and epistemological beliefs?

To answer this question, Pearson correlation coefficient was used between teaching and learning conceptions and epistemological beliefs. Table 4 provides the detailed results of this correlation analysis.

**Table 4.** Correlation matrix of teaching and learning conceptions and epistemological beliefs

Dimensions	1	2	3	4	5	6
Constructivist Conception	1					
Traditional Conception	0.64*	1				
Innate/Fixed Ability	0.58*	0.72*	1			

Learning Effort/Process	0.79*	0.66*	0.68*	1		
Authority/Expert Knowledge	0.55*	0.69*	0.74*	0.64*	1	
Certainty Knowledge	0.56*	0.71*	0.62*	0.66*	0.62*	1

(1 – Constructivist Conception, 2 – Traditional Conception, 3 – Innate/Fixed Ability, 4 – Learning Effort/Process, 5 – Authority/Expert Knowledge, 6 – Certainty Knowledge).  
\*(P<0.01)

The results showed a statistically significant relationship between teaching and learning conceptions and epistemological beliefs. The Pearson correlation value ranges from 0.55 to 0.79 between constructive conception and dimensions of epistemological beliefs, and the Pearson correlation value ranging from 0.66 to 0.72 between traditional conception and dimensions of epistemological beliefs.

**Multiple regression analysis:**

Table 5 shows the results of the stepwise regression analysis using epistemological beliefs as predicted teaching and learning conceptions.

**Table 5.** Hierarchical regression of epistemological beliefs and teaching and learning conceptions

Epistemological beliefs	Teaching and learning conceptions	R	R <sup>2</sup>	F	β	T	sig
Innate/Fixed Ability					.584	11.328	0.00
Learning Effort/Process	Constructivist Conception	0.795	0.633	105.555	.792	20.452	0.00
Authority/Expert Knowledge					.556	10.536	0.00
Certainty Knowledge					.563	10.720	0.00
Innate/Fixed Ability					.728	16.713	0.00
Learning Effort/Process	Traditional Conception	0.814	0.663	120.686	.662	13.905	0.00
Authority/Expert Knowledge					.691	15.043	0.00
Certainty Knowledge					.715	16.109	0.00

As shown in Table 5, the results indicate that the epistemological beliefs are significant predictors of constructivist conception: R<sup>2</sup> =0.633, F =105.555, P<0.005. These results were supported by the close to moderate correlation between four variables (r=0.795), approximately 63.3 % of the variance in student constructivist conception was accounted for by epistemological beliefs. Epistemological beliefs are significant predictors of traditional conception: R<sup>2</sup> =0.663, F = 120.686, P<0.005. These results were supported by the close to moderate correlation between four variables (r= 0.814), approximately 66.3 % of the variance in student traditional conception was accounted for by epistemological beliefs.

#### **4. Discussion**

There have been many past studies covering a wide range of cultural and academic contexts, to examine the factors contributing to the relationship in higher education institutions between teachers' instructional practice, and their teaching and learning conceptions and epistemological beliefs. This present study is an investigation into the teaching and learning conceptions and epistemological beliefs of undergraduate student teachers in the Jordanian higher education context.

The results of question one showed that the constructive conception dimension had the highest mean value ( $M=3.43$ ), followed by traditional conception ( $M=3.04$ ), while the epistemological beliefs learning effort/process dimensions had the highest mean value ( $M=3.33$ ), followed by certainty knowledge ( $M=3.04$ ), and then by authority/expert knowledge ( $M=2.92$ ). The lowest mean scores for the innate/ fixed ability ( $M=2.87$ ).

The results of question two showed that there are significant differences in teaching and learning conceptions based on student teachers' gender. For the constructive conception dimensions female students' mean score ( $M=3.74$ ) was higher than of male students ( $M=2.59$ ) and the  $t$  value was ( $-9.289$ ). In other words, that there was a statistically significant difference between male and female student teachers' with respect to constructive conception dimensions of teaching and learning conceptions, in favor of the female students, who held more sophisticated beliefs about constructive conception than their male counterparts. This means that female students' beliefs about learning provides them with ample opportunities to explore, discuss and express their ideas, demonstrating that good teachers always encourage students to think and find answers for themselves. For the traditional conception dimensions the female students' mean score ( $M=3.14$ ) was higher than that of male students ( $M=2.77$ ) and the  $t$  value was ( $-3.846$ ). In other words, there was a statistically significant difference between female student teachers and their male counterparts with respect to traditional conception dimensions of teaching and learning conceptions, in favor of female students, due to their more sophisticated beliefs about traditional conception than male students. This illustrates that female students' beliefs about learning is based on students remembering what the teacher has taught, and see the major task of teachers as the passing on of knowledge and information.

The results of question three showed positive significant relationship between all subscales of the teaching and learning conceptions and all subscales of the epistemological beliefs. This is an indication that the mean scores of both teaching and learning conceptions and epistemological beliefs were increasing concurrently. Green (1971), postulates that the organization of these conceptions into isolated clusters consequently permits the clustering of central beliefs.

The fact that this present study illustrates the student teachers holding teaching and learning conceptions as well as epistemological beliefs simultaneously, lead the researcher to expect their formation into a coherent network, the phenomenon explained by Green's explanation of the contradictory beliefs cluster.

A study by Chan and Elliot (2004) indicates the possibility of epistemological beliefs influencing learning conceptions, while Sheppard and Gilbert (1991) also found that conceptions about learning and the development of learners' epistemological beliefs may be influenced by both the teachers' theories of teaching, and the perceptions of learners with regard to learning approaches.

The findings demonstrated by the present study indicate the possibility of a causal relationship linking the three dimensions of epistemological beliefs: learning effort, expert knowledge and certainty of knowledge, and their influence on conceptions of teaching and learning, and indicate that students who evaluate their personal learning efforts and expertise positively and are less teacher-dependent, hold constructivist conceptions of teaching and learning, whereas those students believing in the certainty of knowledge and reliant on teacher expertise tend to hold traditional conceptions of teaching and learning.

The Hashemite University practices a constructivist philosophy of education consistent with the significant relationships that we have established between the learning/effort process dimension of the epistemological beliefs and constructivist conception of teaching and learning. This concept appears to be recognized and appreciated by the student body awareness of the great importance our university attaches to self-directed and collaborative learning, and the advantages of focusing on solving authentic tasks in a problem-based learning environment.

In their study, Hofer and Pintrich (1997), explain that individual beliefs concerning the nature of knowledge and the nature of knowing are termed epistemological beliefs, recognizing that beliefs about the nature of knowledge are inextricably related to beliefs about the nature of learning.

Chan and Elliot (2004) established links between epistemological beliefs and teaching and learning conceptions, finding significant pathways linking the three epistemological beliefs factors, fixed/innate ability, authority/expert knowledge and certainty of knowledge, and the traditional teaching and learning conception, and additionally, found a pathway linking the constructivist conception of teaching and learning with the learning effort/process epistemological beliefs factor.

### 5. Conclusion

The resultant findings of this present study are equally important for both students and faculty members, since the instructors need to realize the probability of the teaching process becoming an effective variable in the students epistemological beliefs, opening doors to new vistas and stimulating novel alternative solutions and ideas from the students, while similarly, instructors may benefit by helping them to explore the teaching and learning conceptions of the students in their classes, thus encouraging positive student attitudes towards their classes.

A comparison of the epistemological beliefs of the instructors and students, as well as an exploration of the students' personal characteristics as opposed to focusing solely on their educational characteristics, might make a positive contribution to a wider, deeper understanding of the topic in further studies.

Further research could also explore the relationship between teachers' personal characteristics such as their work ethic commitment, self-efficacy and motivation, and the contemporary changes in conceptions of learning and teaching. The researcher therefore recommends a mixed-method approach, combining qualitative and quantitative study designs.

### 6. Limitation

Notwithstanding these promising findings, there are a couple of noteworthy limitations. Firstly, the study sample for the present study was drawn solely from an undergraduate student teachers population. Valuable future research into the psychometric qualities of the teaching and learning and epistemological beliefs scales could well encompass other populations such as secondary school students, for example. The second limitation of the current study is seen as its only being able to infer correlation, but not causal relationship. Finally, this study conducted in the Hashemite University because a researcher as work in it.

### References

Aypay, 2011a – Aypay, A. (2011a). Öğretme ve öğrenme anlayışları ölçeği'nin Türkiye uyarlaması ve epistemolojik inançlar ile öğretme ve öğrenme anlayışları arasındaki ilişkiler. *Kuram ve Uygulamada Eğitim Bilimleri*, 11(1), 7–29. [in Turkish]

Aypay, 2011b – Aypay, A. (2011b). Epistemolojik inançlar ölçeğinin Türkiye uyarlaması ve öğretmen adaylarının epistemolojik inançlarının incelenmesi. *Eskişehir Osmangazi Üniversitesi Sosyal Bilimler Dergisi*, 12(1), 1–15. [in Turkish]

Brownlee et al., 2001 – Brownlee, J., Purdie, N., Boulton-Lewis, G. (2001). Changing epistemological beliefs in pre-service teacher education students. *Teaching in Higher Education*, 6, 247–268.

Chai et al., 2009 – Chai, C.S., Teo, T., Lee, C.B. (2009). The change in epistemological beliefs and beliefs about teaching and learning: a study among pre-service teachers. *Asia-Pacific Journal of Teacher Education*, 37(4), 351–362.

Chan, Elliot, 2004 – Chan, K.W., Elliot, R.G. (2004). Relational analysis of personal epistemology and conceptions about teaching and learning. *Teaching and Teacher Education*, 20, 817–831.

Chan et al., 2007 – Chan, K., Tan, J., Khoo, A. (2007). Pre-service teachers' conceptions about teaching and learning: a closer look at Singapore cultural context. *Asia-Pacific Journal of Teacher Education*, 35(2), 181–195.



**Cheng et al., 2009** – Cheng, M.H., Chan, K.W., Tang, S.Y.F., & Cheng, A.Y.N. (2009). Pre-service teacher education students' epistemological beliefs and their conceptions of teaching. *Teaching and Teacher Education*, 25, 319–327.

**Clements, Battista, 1990** – Clements, D.H., Battista, M.T. (1990). Constructivist learning and teaching. *Arithmetic Teacher*, 38 (1), 34–35.

**Deryakulu, 2002** – Deryakulu, D. (2002). *Denetim odağı ve epistemolojik inançların öğretim materyalini kavramayı denetleme türü ve düzeyi ile ilişkisi*. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 22, 55–61.

**Eren, 2009** – Eren, A. (2009). Examining the teacher efficacy and achievement goals as predictors of Turkish student teachers' conceptions about teaching and learning. *Australian Journal of Teacher Education*, 34(1), 69–87.

**Green, 1971** – Green, T. (1971). *The activities of teaching* New York: McGraw-Hill.

**Hewson et al., 1993** – Hewson, P.W., Kerby, H.W. (1993). Conceptions of teaching science held by experienced high school science teachers. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Washington, DC. ERIC ED 364426.

**Ho et al., 2001** – Ho, A., Watkins, D., Kelly, M. (2001). The conceptual change approach to improving teaching and learning: An evaluation of a Hong Kong staff development programmer. *Higher Education*, 42, 143–169.

**Hofer, 2001** – Hofer, B.K. (2001). Personal epistemology research: Implications for learning and teaching. *Educational Psychology Review*, 13, 353–383.

**Hofer, Pintrich, 1997** – Hofer, B., Pintrich, P.R. (1997). Development of epistemological theories: beliefs about knowledge and knowing and their relations to learning. *Review of Educational Research*, 67, 88–140.

**Hofer, Pintrich, 2002** – Hofer, B., Pintrich, P. (2002). Epistemology: The psychology of beliefs about knowledge and knowing. Mahwah, NJ: Erlbaum.

**Koballa et al., 2005** – Koballa, T.R., Glynn, S.M., Upson, L. & Coleman, D.C. (2005). Conceptions of teaching science held by novice teachers in an alternative certification program. *Journal of Science Teacher Education*, 16, 287–308.

**Koballa et al., 2000** – Koballa, T.R., Graber, W., Coleman, D.C., Kemp, A.C. (2000). Prospective gymnasium teachers' conceptions of chemistry learning and teaching. *International Journal of Science Education*, 22(2), 209–22.

**Maggioni, Parkinson, 2008** – Maggioni, L., Parkinson, M.M. (2008). The role of teacher epistemic cognition, epistemic beliefs, and calibration in instruction. *Educational Psychology Review*, 20(4), 445–461.

**Meirink et al., 2009** – Meirink, J.A., Meijer, P.C., Verloop, N., Bergen, C.M. (2009). Understanding teacher learning in secondary education: The relations of teacher activities to changed beliefs about teaching and learning. *Teaching and Teacher Education*, 25(1), 89–100.

**Miller, 1997** – Miller, P.H. (1997). *Theories of developmental psychology* (5<sup>th</sup>ed.). New York: W.H. Freeman and Company.

**Otting et al., 2010** – Otting, H., Zwall, W., Tempelaar, D., Gijsselaers, W. (2010). The structural relationship between students' epistemological beliefs and conceptions of teaching and learning. *Studies in Higher Education*, 35(7), 741–760.

**Perry, 1970** – Perry, W.G. (1970). *Forms of intellectual and ethical development in the college years: A scheme*. New York: Holt, Rinehart and Winston.

**Pillay et al., 2000** – Pillay, H., Purdie, N., Boulton-Lewis, G. (2000). Investigating cross-cultural variations in conceptions of learning and the use of self-regulated strategies. *Education Journal*, 28(1), 65–84.

**Purdie, Hattie, 2002** – Purdie, N., Hattie, J. (2002). Assessing students' conceptions of learning. *Australian Journal of Educational and Developmental Psychology*, 2, 17–32.

**Purdie et al., 1996** – Purdie, N., Hattie, J., Douglas, G. (1996). Student conceptions of learning and their use of self-regulated learning strategies: Across-cultural comparison. *Journal of Educational Psychology*, 88(1), 87–100.

**Saban, 2003** – Saban, A. (2003). A Turkish profile of prospective elementary school teachers and their views of teaching. *Teaching and Teacher Education*, 19(8), 829–846.

[Saban et al., 2007](#) – Saban, A., Kocbecker, B.N., Saban, A. (2007). Prospective teachers' conceptions of teaching and learning revealed through metaphor analysis. *Learning and Instruction*, 17, 123–139.

[Sheppard, Gilbert, 1991](#) – Sheppard, C., Gilbert, J. (1991) Course design, teaching method, and student epistemology. *Higher Education*, 22, 229–249.

[Schommer, 1990](#) – Schommer, M. (1990). Effects of beliefs about the nature of knowledge on comprehension. *Journal of Educational Psychology*, 82, 498–504.

[Schommer, 1994](#) – Schommer, M. (1994). Synthesizing epistemological belief research: Tentative understandings and provocative confusions. *Educational Psychology Review*, 6(4), 293–319.

[Tsai, 2002](#) – Tsai, C.-C. (2002). Nested epistemologies: science teachers' beliefs of teaching, learning and science. *International Journal of Science Education*, 24(8), 771-783.

[Tsai, 2004](#) – Tsai, C.-C. (2004). Conceptions of learning science among high school students in Taiwan: A phenomenographic analysis. *International Journal of Science Education*, 26(14), 1733–1750.

[Tolhurst, 2007](#) – Tolhurst, D. (2007). The influence of learning environments on students' epistemological beliefs and learning outcomes. *Teaching in Higher Education*, 12(2), 219–233.

[Wong et al., 2009](#) – Wong, A.K., Chan, K., Lai, P. (2009). Revisiting the relationship of epistemological beliefs and conceptions about teaching and learning of pre-service teachers in Hong Kong. *The Asia-Pacific Education Researchers*, 18(1), 1–19.