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Adaptation of Clinical Decision Making in Nursing Scale to Undergraduate Students of Nursing: The Study of Reliability and Validity

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ABSTRACT

A clinical decision making skill is essential in the implementation   of nursing knowledge and reflecting on patient care. The research was planned to measure the reliability and validity of The Clinical Decision Making in Nursing Scale (CDMNSTr) for undergraduate nursing students from Turkey. This study is a methodological design. This study was conducted on 210 undergraduate students of nursing. For validity; Language – Content Validity and Construct Validity (Exploratory and Confirmatory Factor Analysis) were examined. For reliability; CDMNS's Cronbach's alpha reliability coefficient, item-total score correlation coefficients and stability analysis (test-retest) were examined. Item Content Validity Index and Scale Content Validity Index were calculated as .81 and .83 respectively. Confirmatory factor analyses showed that goodness of fit indexes were acceptable. Cronbach alpha value of the scale was .78. Item-to-total score correlation coefficients ranged from .13 to .56. The correlation coefficient for test-retest was .82. The scale can be used as a valid and reliable measurement tool to determine the perceptions of Turkish undergraduate students of nursing regarding to clinical decision making.

1. Introduction

Decision making skills are fundamental for nurses who must make effective decisions in a complex and ever-changing healthcare environment (Jenkins, 2001). Nurses are health personnel who analyze the data of the change in patient's condition patients' conditions and determine the priorities; they are also responsible for clinical decision making in care together with the patient and family (Tanner, 2006). Clinical decision making defines practicing as the most appropriate, useful and acceptable alternative among the solutions in order to overcome the problems of the client or patient and his family (Thompson & Dowding, 2002). Clinical decision making in nursing includes the type of care that comes after the effect of illness on patient and family. It also includes determining emotional, socio-cultural and economic shortcomings of patient and family and then using necessary skills to cope with those shortcomings (Tanner, 2006). Briefly, clinical decision making in nursing means practicing professional nursing knowledge and skills (Jenkins, 1983; Tanner, 2006).

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"Clinical decision making" is one of the basic skills developed during baccalaureate nursing education and all graduates are expected to be equipped with these skills (American Association of Colleges of Nursing, 2008). The World Health Organization (WHO) has published the golden standards of nursing education and according to these standards, the development of clinical decision making skills should be provided in nursing school programs (World Health Organization, 2009). Decision making is required in order to acquire expertise (Dunphy & Williamson, 2004). It is necessary to determine the perception of nursing students in clinical decision making, and to develop and evaluate their decision making skills. Therefore, valid and reliable measurement tools are required to evaluate students' perceptions in clinical decision making as well as the way they make decisions. Both at the national and the international level, the number of measurement tools which evaluate clinical decision making skills is limited. Only the Clinical Decision Making in Nursing Scale (CDMNS) was found in the study as a measurement tool for evaluating the perceptions of nursing students in decision making. Adapting the CDMNS to Turkey fulfilled the need at the national level and provided an opportunity to retest the scale in a different culture at the international level.

The CDMNS is used to identify and to evaluate clinical decision making in nursing. The CDMNS was developed by Jenkins (1983). The internal reliability of the items used in the scale where the CDMNS was developed was discussed during a panel with expert educators of undergraduate nursing education and the items on which a consensus was reached were included. Cronbach's alpha reliability coefficient of the original CDMNS internal consistency was found to be .83 and the explanatory factor analysis has showed that the four-factor structure explain 72.3 % of the total variance (Jenkins, 1983 & 1985).

Byrnes and West (2000) used the scale to evaluate the perceptions of nursing students in clinical decision making in Australia. The reliability and validity of CDMNS was not examined in their study. Girot (2000) found that Cronbach's alpha reliability coefficient was .78 among the Canadian graduate nurses. The validity in this study was tested by a group of experienced practitioners who were considered to be 'expert decision-makers' in practice and they established content validity. On the other hand, Baumberger-Henry (2005) found that Cronbach's alpha coefficient was .81 among the nursing students in the USA and the validity in this study was not tested. Gorton (2010) used the CDMSN tool to investigate clinical judgment of the nurse practitioner students and the reliability of the instruments used in this study was evaluated. Cronbach's alpha coefficient was .73 for the CDMNS tool and .67 for the CDMNS evaluation and reevaluation subscale.

No study directly evaluating the clinical decision making of undergraduate students in Turkey was found. However, the evaluative studies on the problem solving processes and critical thinking skills of nursing students state that these skills would indirectly affect decision making. It is obvious that there is a need for a valid and reliable measurement tool that would evaluate the clinical decision making skills of nursing students to help them prepare for professional life. This study was conducted in order to examine the validity and the reliability of the Turkish version of the CDMNS as a tool for evaluating the perception of nursing students in clinical decision making.

2. Method
The research method was a scale adaptation study which was structured based on screening model.

2.1. Sample of the Research
The research was conducted in Dokuz Eylul University, school of nursing in 2009. The research sample comprised 210 undergraduate students of nursing who had previous experience of clinical practice. In thelight of Tavşancıl's recommendations; there were 5 to 10 people per item of an instrument (Tavşancıl, 2006) and the sample size of 210 was considered to be sufficient to conduct factor analysis of the CDMNS which comprised 40 items.

The data were collected with a "Defining Characteristics" form which was composed of three questions and the "CDMNS" in the classroom environment. 210 undergraduate nursing students participated in the research. These students completed their clinical practice. The mean age of the students was 21.13 ± 1.07. All of the students were female. 28.6% of the students (n= 60) were sophomores, 38.1% (n= 80) were in their third year and 33.3% (n=70) were seniors.

2.2. Instruments
Data were collected by using a Demographic Form and The Clinical Decision Making in Nursing Scale.

2.2.1. *The Clinical Decision Making in Nursing Scale (CDMNS):* The original CDMNS was developed by Jenkins (1983) with nursing students in the USA. This scale describes the perception of the nursing students in clinical decision making based on self-expression (Jenkins, 2001).

The original CDMNS is composed of 40 items and four subscales. The subscales of the scale are "search for alternatives or options", "canvassing of objectives and values", "evaluation and reevaluation of consequences", and "search for information and unbiased assimilation of new information". Each subscale is composed of 10 items. 22 items (1, 3, 5, 7, 8, 9, 10, 11, 14, 16, 17, 18, 20, 26, 27,28, 29, 33, 35, 36, 37 and 38) are written as positive. 18 items (2, 4, 6, 12, 13, 15, 19, 21, 22, 23, 24, 25, 30, 31, 32, 34, 39, and 40) are written as negative. In this scale, 18 items are inversely scored. Each item of the scale is evaluated through the five-point likert scale as 5=Always, 4=frequently, 3=occasionally, 2=Seldom, and 1=Never (Jenkins, 1983). Minimum and maximum points to be taken are 40 and 200 in the whole scale and 10 and 50 in the subscales, and there is no cutting point. A high score taken from the scale indicates that the perception in decision making is high, whereas a low score indicates that the perception in decision making is low. The scale is evaluated through the scores obtained from each subscale and the total scale (Jenkins, 1983; 1985; 2001).

2.3. Data Collection

The researchers were given information about the scale and about how to fill it. The objective of the study was explained to a total of 216 students. 210 students volunteered to participate in the study and 6 students refused it. The scales were distributed to the students participating in the study by the researchers. The students completed the scale.

Each student was asked to write down their self-selected password on the scale both during the first attempt and the test-retest practice which was conducted 6 weeks later to check the stability of the scale. Thus, it was possible to gather the data safely by hiding the students' identities and to match them up. As a result of the re-test, 109 students (51.9 %) who responded to the scale were taken into consideration, incomplete forms and forms with mismatching passwords were excluded. Each participant needed approximately 10-15 minutes to complete the scale. Demographic data were self reported by the students and subsequently obtained from the demographic form.

2.4. Ethical considerations

Ethical approval was obtained from the Ethics Committee of the School of Nursing. During data collection, the students were informed about the aim of the research and verbal informed consent was obtained from each participant.

2.5. Data analysis

Data were analyzed by using Statistical Package for Social Sciences (SPSS) version 15.0 and LISREL 8 statistical program software. The Content validity of the Turkish version of CDMNS was tested by requesting opinions of experts using the Content Validity Index (CVI). The Exploratory Factor Analysis (EFA) and The Confirmatory Factor Analyses (CFA) were used to determine the construct validity. The Confirmatory Factor Analyses (CFA) was used to determine the construct validity of the Turkish version of CDMNS with LISREL 8 statistical program software. In terms of scale reliability, Cronbach's alpha reliability coefficient and the item analysis were used to find out the internal consistency of the scale and the subscales. The stability of the scale was tested by test-retest reliability coefficients.

3. Results

3.1. Descriptive Statistics of CDMNS-Tr

The CDMNS-Tr score mean is 160.82±10.75 and the subscale score means are between 39.78±3.29 and 40.58±3.45. The lowest and the highest scores for CDMNS were 132.00 and 185.0 respectively. The standard error value of the scale was determined to be .74 whereas the standard error values were between .21 and .25 for the subscales in Table 1.

Table 1: Results of the Clinical Decision Making in Nursing Scale and Subscale Analysis (n: 210)

CDMNS and Subscale	Mean-SD	SE*	Median	Min	Max	r+	α≠
Search for alternatives or options	40.58±3.45	.23	41.00	29.00	50.00	.82	.50
Canvassing of objectives and values	39.78±3.29	.22	40.00	32.00	49.00	.77	.44
Evaluation and reevaluation of consequences	39.91±3.72	.25	40.00	30.00	49.00	.80	.52
Search for information and unbiased assimilation of new information	40.54±3.13	.21	41.00	31.00	50.00	.74	.40
The total of CDMNS	160.82±10.75	.74	161.00	132.00	185.00		.78

*SE: Standart errors

+r: Correlation coefficients

≠α: Cronbach's Alpha Reliability Coefficient

3.2. Validity of the CDMNS-Tr

3.2.1. *Linguistic Validity*. In order to ensure the language validity of the original CDMNS, language experts who are familiar with both languages and cultures translated the scale from English to Turkish. The most suitable expressions were selected from the translated versions of the CDMNS, and a single version of the scale was created. In order to test whether the Turkish version of the scale provided the same meaning, the resultant Turkish version of the CDMNS was backtranslated into English, the scale was once more translated by two different experts who had not seen the English version of the scale and had a good command of both languages. The items of the back-translated scale were examined and it was seen that the meanings were close to the original scale. The linguistic validity of the CDMNS was confirmed.

3.2.2. *Content Validity*. To test content validity, a total of eight experts specializing in nursing education were asked to give their opinions about the CDMNS whose content validity was confirmed. Each question in the CDMNS was scored by the experts on a 4-point scale: 1=not relevant, 4=highly relevant. In accordance with the experts' recommendations, necessary changes in the items were made. Evaluations of expert opinions were made with Content Validity Index (Polit & Beck, 2006). The Content Validity Index (CVI) was calculated both for the items and the scale. The item–CVI was calculated by using the formula of the number of experts who gave three points (quite relevant) or four points (highly relevant) for each item divided by the total number of experts. The calculated ratios were then added up and the total ratio was divided by the total number of items. It was recommended not to have Item Content Validity Index below 0.78 (Polit & Beck, 2006), if there were six or more experts. For the scale- CVI, each expert was separately evaluated at the first step. For each expert's evaluation, the total number of their rating of 3 or 4 (i.e. quite or highly relevant) was divided by the total number of items. Then the ratios which were calculated for each expert were added up and divided by the total number of experts. Scale- Content Validity Index was recommended to be 0.80 minimum (Polit & Beck, 2006). The Content Validity Index for Items (I-CVI) and The Content Validity Index for Scale (S-CVI) were calculated as .81 and .83 respectively.

3.2.3. *Pre-application*. Linguistic and content validity of the CDMNS was completed. It was piloted on 12 senior students having the characteristics of the study sample. Three students stated that items 14, 20 and 31 were not comprehensible. In accordance with the feedback from these students, necessary changes were made on the items without altering the meaning. As a result of these revisions in the scale, the final version of the scale was applied to the whole sampling group.

3.2.4. *Construct Validity.* In the adaptation study of the scale, the construct validity was first tested by exploratory factor analysis and then confirmatory factor analaysis in the same sample group (n:210). Recently, it has been suggested to perform exploratory and confirmatory factor analysis for similar but separate samples. It can be considered as a limitation to perform for the same sample in this study. The results were given separately under different subtitles.

In Exploratory Factor Analysis (EFA), Kaiser-Meyer-Olkin value was the evaluation criteria for sample adequacy. Kaiser-Meyer-Olkin value was .73. (Bartlett's Test of Sphericity; X^2: 2039,161, df: 780 and p< 0.001). Seven factor of scale explains 60.8 % of the total variance.

Secondly, confirmatory factor analysis (CFA) with structural equation modeling was conducted to check the construct validity of the CDMNS-Tr. In CFA, the goodness of fit statistics and modification index results were examined without any restrictions in the model by adding new connections. The results of the goodness of fit statistics of the scale were as in the following: [(χ^2 (740, N= 210) =1725.02, p=0.000, RMSEA=.080, S-RMR=.089, GFI=.71, AGFI=.68, CFI =.76] (Table 2). The results of the goodness of fit statistics of the items that constitute the subscale were as in the following: [(χ^2 (734, N = 210) = 1711.93, p=0.000, RMSEA=.08, S-RMR=.089, GFI=.71, AGFI=.68, CFI=.76].

Table 2: Confirmatory Factor Analysis of Clinical Decision Making in Nursing Scale

CFA Model Compatibility Indexes	Expected Values	CDMNS^{Tr} Form
Minimum Fit Function Chi-Square (χ^2)	χ^2 / df < 5	χ^2 / df = 2.3
Degrees of Freedom (df)		
Root Mean Squared Error of Approximation (RMSEA)	<.08	.08
Standardized Root Mean Square Residual(SRMR)	<.08	.089
Comparative Fit Index (CFI)	>.90	.76
Goodness of Fit Index (GFI)	>.90	.71
Adjusted Goodness of Fit Index (AGFI)	>.90	.68

3.3. Reliability of the CDMNS-Tr

3.3.1. *CDMNS's Cronbach's Alpha Reliability Coefficient*. The total Cronbach's alpha reliability coefficient of the CDMNS was .78. It was found out to be .50, .44, .52 and .40 in the subscales, respectively (Table 1).

3.3.2. *CDMNS's Item - Total Correlation.* Item analysis is the method of assessment of correlation coefficients between item and total score. CDMNS's item - total correlation ranged from .13 to .56 for CDMNS-Tr. All correlation coefficients were statistically significant (P< .05). The items 2, 11, 27 and 28, respectively were .20 less than the scale item the total correlation. The items which were .20 less than the scale item total correlation coefficients were 2,11,27 and 28, respectively. These items were about professional responsibilities and values. There was no increase in the correlation coefficients in the absence of these items. Cronbach's alpha coefficient did not change during the analysis in the absence of these items. These items were excluded from the scale since the total score of the scale; the total score of the sub-scale and sub-scale total correlation were high and acceptable. The total scale score and the total subscale score correlation were between .74 and .82 (Table 1).

3.3.3. *CDMNS's Stability Analysis*. CDMNS's stability was examined by comparing the test-retest Pearson correlation coefficients. There was not a significant difference in the scores for the CDMNS-Tr between test–retest total scores and the subscale total scores (P> 0.05). Correspondingly, the CDMNS's test–retest total score correlation coefficient was .82 and subscale total score correlation coefficients were .66, .56, .63, .67, respectively and this difference was significant (p=0.000).

4. Discussion

In this study, we tested the reliability and validity of the CDMNS for the Turkish culture in a sample of nursing students. This study examined the linguistic validity, content validity, construct validity and reliability of CDMNS in nursing students within Turkish culture.

4.1. Validity

Linguistic validity. Translation of a scale from its original version to the target language and its back translation was the most commonly used methods (Aksayan & Gözüm, 2002). Translators' knowledge and experience have a great influence on the result. Therefore, translators who know cultures and who have a good command of both languages should be selected (Aksayan & Gözüm, 2002). The CDMNS's language understandability was evaluated. For this reason, the scale was translated into Turkish by two people knowing both languages and cultures well and its back translation was made by two other people who know both languages and cultures well but had not seen the scale before. While preparing the Turkish form of the scale, particular attention was paid to ensure that the statements were suitable for the Turkish language structure and had the same cultural connotations (Hilton & Skrutkowski, 2002). The linguistic validity was confirmed.

Content validity. The aim of content validity is that experts decide whether items of a scale represent the construct planned to be measured and create a scale including meaningful items (Eser, 2007; Ercan & Kan, 2004). It is recommended that expert opinion regarding the content validity should be requested from three specialists minimum and ten specialists maximum (Polit & Beck, 2006). In this study, to test the content validity of the scale, a total of eight experts specialized in nursing education were asked to comment on whether the items of the CDMNS were appropriate.

CVI was used to determine whether the experts agreed (Polit & Beck, 2006). CVI is computed two ways; item and scale CVI. Item -CVI was computed for each item and should be greater than .78. Scale -CVI was computed for the all the items of scale and should be greater than .80 (Polit & Beck, 2006). In this study I-CVI and S-CVI values of the CDMNS-Tr was found acceptable. (Polit&Beck, 2006). The values indicated a consensus among experts concerning items of the CDMNS-Tr.

Construct validity. KMO value was .73 in explanatory factor analysis. KMO values between .70 and .79 were considered to be good values. This showed the sample size to be sufficient to carry out the factor analysis (Akgül and Çevik, 2005).

Confirmative factor analysis (CFA) was usually used to develop scales, revise the scales or evaluates construct validity (Jackson, Gillaspy, Purc-Stephenson, 2009). Confirmative factor analysis (CFA) is used to give information about the construct validity. In order to observe the construct validity of the scale adaptation, the similarity to the original scale factor construct was checked by CFA (Dimitrov 2010; Şimşek, 2007). CFA showed that the goodness of fit statistics were [(χ^2 (df= 740, N=210) = 1725.02, p=0.000, X^2/df: 2.3 RMSEA=.080, S-RMR=.089, GFI=.71, AGFI=.68, CFI=.76]. The analysis showed that the Chi square value (χ^2) was significant. A high χ^2 value was common in the majority of the samples. Therefore, the calculation was done by dividing χ^2 value by degrees of freedom (df). This ratio being five or lower indicates that the model has acceptable goodness of fit (Şimşek, 2007). As the value obtained by dividing the CDMNS's χ^2 into df was 2.3, the model had acceptable goodness of fit. In addition to χ^2 values, CFA examined many other goodness of fit statistics. The most common ones among these are GFI, AGFI, CFI, RMSEA and SRMR. GFI, AGFI and CFI values above .90 (Schreiber, Nora, Stage, Barlow, King, 2006; Ullman 2006; Şimşek, 2007; Jackson, Gillaspy, Purc-Stephenson, 2009), and RMSEA and SRMR values below .80 are indicators of acceptable goodness of fit (Schreiber, Nora, Stage, Barlow, King, 2006; Şimşek, 2007). However, in this study GFI, AGFI and CFI were all below .90 and hence, the goodness of fit was not as expected. On the other hand, RMSEA and SRMR were both .80 and were within the acceptable limits, indicating that the factor construct is similar to that of the original scale. The model constructed according to the subscales also has the same characteristics (Table 2). In the modifications suggested for this model, items were associated with the subscales as; item 3 with the subscale of 'search for information and unbiased assimilation of new information', items 11, 15 and 29 with the subscale of 'search for alternatives or options', item 36 with the subscale of 'canvassing of objectives and values' and item 40 with the subscale of 'Evaluation and

reevaluation of consequences'. The suggested modification analyses were not conducted as these suggested items were closely correlated and all the items had a theoretical relationship in general.

CFA showed that the items 2, 11, 25, 27, 28, 30 and 31 were statistically insignificant (p>0.05, t value <1.96). The correlation coefficients of these items was less than 0.20. When these items were excluded, CFA goodness of fit values did not manifest a significant change [(χ^2 (df= 528, N=210)=1088.74, p=0.000, RMSEA=.084, S-RMR=.090, GFI=.73, AGFI=.70, CFI=.76]. Therefore, the items were not excluded from the model. These items were related with professional values, patients' and families' values which were the important components of clinical decision making and it was needed to reevaluate the relationship between these items and before mentioned values. Correlation coefficients of confirmatory factor analysis were under acceptable limits in this study and this meant that the scale needed to be reevaluated.

4.2. Reliability
The standard error of the scale is presented in Table 1 as a measure to support its reliability. The low standard error of the scale means that its reliability is high, whereas a high standard error indicates low reliability (Tavşancıl, 2006). The low standard errors of both the CDMNS total and the subscales strengthen the reliability of the measurement tool.

Cronbach's alpha reliability coefficient is an important indicator of reliability. The total Cronbach's alpha reliability coefficient of the CDMNS was .78. It was determined to be .50, .44, .52 and .40, respectively in the subscales. Cronbach's alpha reliability coefficient ranging between .60 and .80 indicates that the scale is notably reliable, whereas a value between .40 and .60 specifies that the scale has low reliability (Özdamar, 2004; Tavşancıl, 2006). According to these criteria, the CDMNS is reliable; nevertheless the subscales has low reliability. The original CDMNS Cronbach's alpha reliability coefficient was 0.83. Jenkins (1985) did not report reliability for any of the subscales of the original CDMNS. Whereas the study of Baumberger-Henry (2005) found it out to be 0.81 and the subscales were .53, .57, .58 and .51. Cronbach's alpha reliability coefficients of the scale and the subscales were similar. The results indicate that the scale items are consistent and they constitute a whole. The scale should be applied as a whole. The sub-scales of CDMNS have low Cronbach's alpha reliability coefficients. Therefore, the sub-scales of CDMNS are not used alone. Even though the reliability coefficients of total scale were under acceptable limits in this study, they were at lower yet acceptable levels in subscales and this was important as it showed that the measurement tool needed to be further improved.

One of the methods that show the internal consistency of the scale is item analysis. It is observed that the CDMNS's item-total correlation coefficients vary between 0.13 and 0.56 and these values are statistically significant (p<0.05). The correlation coefficients of the scale-total score and the subscale-total score were .74 and .82, respectively (Table 1). Although it was not presented in the findings, the subscale item-total correlation coefficients were within the range of .22-.57. Jenkins (1983) did not provide the item correlations of the original scale. Except for the 4 items that are below the acceptable levels in the item analysis, it is seen that 40 items are consistent among them and thus constitute a whole. Given that the correlation coefficients below .20 indicate a weak relationship these items were suggested to be excluded from the scale, but this is not a strict rule. When the item correlations are below .20 and the items are deleted, it is recommended to check the change in Cronbach's alpha coefficient. Only if Cronbach's alpha coefficient increases when an item is excluded, can the item be deleted. It should be noted whether these items could be distinctive (LoBiondo-Wood & Haber, 2005; Özdamar, 2004; Şencan, 2005). It was seen that the items 2, 11, 27 and 28 scored below 0.20 when the CDMNS's item-total correlations were observed. When the items related to the perception in professional responsibility and values are excluded, it is seen that Cronbach's alpha coefficient does not change. Scale-total score, subscale-total score and subscale-item-total score correlation coefficients are high and above the acceptable levels and this indicates that these items should not be excluded. Therefore, it was concluded that these items support the scale and do not change the reliability.

Test-retest values in the adapted scale indicate the consistency of the measurement tool from practice to practice and its stability through time. In the light of the recommendation to assess stability over a 2 to 6weeks period (Tabachnick&Fidell; 1996), we administered the retest approximately 6 weeks after the initial administration.

It is suggested that both measurement results should be similar (Gözüm & Aksayan, 2003; LoBiondo-Wood & Haber, 2005). The similarity of the CDMNS's test-retest total scores and subscale scores (p>0.05), and their intermediate and high correlation (p= 0.000) show that the scale is consistent and stable.

Limitations

Although it is an important tool to evaluate the clinical decision making, the cronbach's alpha reliability coefficient of the subscales and the results of the goodness of fit statistics of the scale are low. This is a limitation.

5. Conclusion

In conclusion, it is observed that the Turkish version of the Clinical Decision Making in Nursing Scale (CDMNSTr) is a reliable and valid tool for examining the perceptions of the Turkish undergraduate students of nursing in clinical decision making. However, the low correlation coefficients in some items observed during the item analysis are related to different interpretations of language, culture and professional values. Although the original meaning was obtained in the language validity of the scale, it is possible that the adapted society has diverse cultural conceptual schemes. Therefore, it is suggested that the concepts put forward by the items be qualitatively examined and that the items be re-arranged. In general, the results indicate that the CDMNS would be useful in determining the perceptions of undergraduate nursing students in decision making after their first clinical practice at the national level. The data gathered through this scale could provide the basis for developing the perceptions of the students in decision making and improving the nursing curriculum in order to help students gain this skill.

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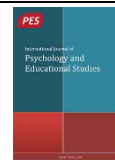
Assessing the Implicit Achievement Motive: Effects of Input-Condition, Administration And Picture-Position

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ABSTRACT

Implicit measurements are sensitive for influences of experimenter and situation. An assessment using computers could therefore avert those negative effects, if there is an adequate translation to computer (Blankenship, 2010). We split the implicit achievement motive into the two components hope of success (HS) and fear of failure (FF) and investigated the effects of input condition (handwritten vs. keyboard), administration (online vs. computer vs. human experimenter) and picture-position for each of these two components. Therefore 140 undergraduates were randomly assigned to 18 experimental groups of a counterbalance within-between-design and assessed with the Thematic-Apperception-Test (TAT; Heckhausen, 1963). The outcome is that handwriting increases the HS-score, whereby FF-score did not differ in typed and handwritten answers. People instructed by human experimenter show higher FF and lower HS compared to computer based tested people in the labor and online. There is no statistical significant interaction effect of administration and input condition. There is either no position effect for any of these motive-components. The TAT seems to be more robust than commonly thought.

Keywords:
implicit motive, achievement, input, administration, position

1. Introduction

The research of implicit motives is getting more and more important again: In the last ten years 902 studies were conducted using the Thematic Apperception Test (TAT), even more than the number of studies in the 80's and 90's together, which is 759 (Source: Psycinfo, May 2015). The TAT, developed by Morgan and Murray (1935), has been shown to assess implicit motives. Therefore people get presented different pictures with the instruction of writing stories, which leads them to identify with the protagonist of the picture and project their own implicit motives into the story. With this technique of projection, the problem of social desirability can be prevented, because even negative thoughts and needs can be ascribed to the protagonist, not threatening the self. The story depends on the inner world of the subject as well as the prompt-character of the picture and influences of the circumstancing situation. Instead of using this test as a clinical instrument, the research groups of McClelland and of Heckhausen applied this instrument for assessing implicit motives, especially achievement motive (nAch). Heckhausen (1963; English language translation by Schultheiss, 2001) assumed that a motive consists of a need, an instrumental activity, an anticipatory goal, the mention of praise resp. blame, an affective state for achievement as well as an achievement theme and an extra category failure for FF. So he developed a scoring system with 13 categories separately rated for each picture: Six of them define the scale "hope of success" (HS) and seven the scale "fear of failure" (FF).

Heckhausen (1963) used six pictures describing a smiling man at the desk (picture A), a man in front of the directors room (B), two men on the workbench (C), a pupil on the blackboard (D), a man working at the desk

(E), two men on a machine (F), whereby three of them mainly activate HS (A, C, E) and three activate FF (B, D, F). People are instructed to write answers to the following four questions: Who are the persons? What do they want and feel? What happened before? How does it proceed? For each picture a score for HS and FF can be reported as well as the achievement motive (nAch), which is generated by the sum of HS and FF. But this simple summation of HS and FF was often criticized: nAch seems not as predictive for behaviour as the distinction into HS and FF (e.g. Pang, 2010). An explanation is according to the quadripolar model of Covington and Roberts (1994) that HS and FF are two relative uncorrelated components of nAch, which should not be summed up, but only interpreted with the other one in mind. Covington and Roberts (1994) further stated four different types of personality characteristics: failure-accepters have low FF and low HS overstrivers have high FF and high HS, optimists have high HS and low FF and failure-avoiders have high FF and low HS (see figure 1). Differentiating these four types is important, because failure-avoiders act to avoid failure or alter the meaning of failure, and do not set themselves realistic aims, they can challenge.

Figure 1: The four components of quadripolar model (Covington & Roberts, 1994) described by the two components hope of success (HS) and fear of failure (FF)
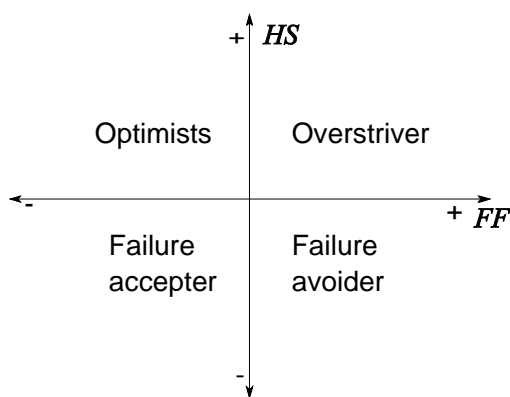
The aim of this study is to give a detailed insight in some factors, which influence the assessment of achievement motives, especially under the focus of creating a valid computer-based TAT; And also to get information and investigate our hypothesis about differential effects of these factors by differentiating between the two components of nAch, for which less work is done up to now.

A first factor that could influence the score of nAch is the administration-situation. Schultheiss and Pang (2007) as well as Blankenship (2010) discuss the difference of human experimenter versus computer-based test-situation and assume that test-administration by a human experimenter could lead to higher motive-scores than a computer-based test-situation because the human experimenter will have higher status and so cause more social pressure. So if someone has a high status (like the professor of the course) people will show more nAch than if the test is administered by another student (Smith, 1992). Bernecker and Job (2011) differenced here also between completely online test situation and computer-based situation with human instructor and stated, that in online setting people are more likely to show their real implicit motives. Another reason for differences could be that the instruction given by a computer is always the same, but human instruction could differ. So Lundy (1985) found that different instruction influences retest-reliability of the TAT and therefore the test results too. Also nonverbal signs like looking on the clock or calling the situation a test could evocate nAch (Gross, 2007). Klinger (1967) evaluated whether nonverbal signals influence nAch. There were two actors: the achievement-type wore suit and tie, behaved like a manager and simulated high nAch. The affiliation-type wore casual clothes and was acting in a social way. The first type stimulated achievement-based statements, the second one affiliation-based statements. But also gender and race are important factors: Dee (2005) found that same race leads to higher nAch. So after all there are many factors in the interaction of experimenter and participants, which can confound a test: Some are unchangeable like gender or race; others are unconscious like nonverbal behaviour. The last one is very important: Jensen et al. (2012) found that unconscious facial expressions change even the strength of placebo-effect, given a pain related stimulus. So Hewson, Laurent and Vogel (1996) generally think measuring with the computer is a better way.

A next factor, that influences the motive-score, is word-count; the longer written stories the more chance have participants to write a motive-relevant aspect for the coding-system and so they get a higher motive-score. Pang and Schultheiss (2005) found a significant correlation of *r* = .23 between word-count and nAch, Hofer et al. (2010) of *r* = .34 and Ricciutu (1954) even of *r* = .50. Winter (1993) even introduced a word-count-correction. But Lesser, Krawitz and Packard (1963) reported word-count having no influence on nAch. In the study of Schultheiss, Liening and Schad (2008) the subjects wrote TAT-stories with 36 % more words using a keyboard than writing by hand, accompanied by the effect that motive-scores were statistical significant higher when a story was typed. Blankenship and Zoota (1998) investigated these effects for power- and affiliation motive and found that typing-condition does not matter, although people wrote more with the keyboard than by hand.

A third factor that could influence motive-score is the order of the pictures, what Smith (1992) claimed a very important aspect for a good TAT. He proposed to set pictures encouraging less nAch on earlier position of the test, because a picture, which encourages high nAch will inhibit the motive-caused content of the later one. A theoretical frame underlying this is the Dynamics of Action theory (DoA; Atkinson & Birch, 1970). According to this theory writing a specific story is determined by an instigating force (F) to do so and a consummatory force (C), which lowers the need to write about this topic when it was actually done. There are several tendencies concurring with each other, one is for example to show achievement related behaviour. As long as F minus C (after writing about the specific topic) is the highest need, the subject will write about topic F. On some point the instigating force to write about another topic (maybe some affiliation stuff) becomes higher, so that the achievement-score of this story will be lower. Depending on the underlying motive the following story could be influenced by the nAch again, because of the consummatory force of affiliation when writing about and the instigating force of achievement when doing not so. In other words, if someone wrote a very achievement related story in response to the first picture the drive to write a similar achievement related story for the following picture is reduced and he or she will write about something else, but not because of a lower implicit motive, just because the drive of writing such a story was already satisfied by the consummatory force in the first picture. After a time the instigating force will be higher and so on, for example in the next picture a hope for success content will appear. For this resulting cyclic descending course over time the effect is also called the "saw tooth effect" (Atkinson, Bongort & Price, 1977).

Reumann (1982) assessed this effect empirically using an 8-picture TAT: Comparing the score of the first and last four pictures he found that stories of later pictures significantly contain less nAch statements than earlier ones. Also Tuerlinckx, deBoeck and Lens (2002) as well as Schultheiss et al. (2008) investigated the assumptions of DoA empirically, but had to contradict it. Pang and Schultheiss (2005) found this theory only fitting to affiliation- and power-motive but not to nAch. A reason for this could be that nAch consists of the two aspects fear of failure and hope of success. So Blankenship (1987; 2010) differentiated these components and calculated a computer simulation for four hypothetical subjects, finding that only people with high instigating force F to achieve success show typically high motive cycles as expected in the DoA. She also proved the results of this simulation in three experimental designs; but it has not been empirically investigated with the TAT so far.

To put all in a nutshell, there is still little research, which has a differentiated view on the difference of computer- versus human-based test situation and the role of handwritten and typed answers regarding HS and FF. And also the position-effects of the DoA using these two components has been less researched. So the aim of the conducted study is to investigate in an experimental design whether the current results regarding input-condition, administration and picture-position can be replicated, having a view on the two components of achievement motives.

2. Expectations

There are some expectations we conduct to the following study according to the underlying research: With Schultheiss and Pang (2007) in the comparisons of computer vs. human-administrated test higher motive-scores in the human-administrated test-session are expected, because the human-administrator will be seen as an authority and evocate social pressure. This aspect will mostly lead to a higher fear of failure-score

instead of hope of success, because as Heckhausen (1963) claimed, being under the eye of an authority-person will force FF. So a human-administrated situation will force the score of HS and especially fear-related components in comparison with the computer administrated condition. The online computer-test without human instructor will force the lowest motive-scores.

We further expect that word-count has a statistical significant influence on the scores of HS and FF, and because people can write more with the keyboard - and so have more change to give a motive related answer -, they will show higher motive-scores in the typed condition than in the handwritten condition (Schultheiss et al., 2008). Besides we assume that typing-experience will influence the difference between typed and handwritten motive-score (because it determinates word-count) in that way that the higher the typing-experience the more difference will be between word-count (and so motive-scores) on typed vs. handwritten answers.

We further investigate whether there is an interaction-effect of input-condition and administration, which is very relevant when looking forward to a computer-based TAT. So if a human-administrated test will increases FF and HS and typing will do the same, an interaction might occur in that way that the highest scores for FF and HS will be expected when the administration is done by human instructor and the answers are given typed. A reason for this could be that commonly people answer questionnaires given by a human with hand and those given by PC with keyboard: The new situation of writing with keyboard and being under the eye of a human instructor appears as a special task, which forces HS and FF, so people will write more with the keyboard in this situation then when instructed by the computer. Also handwriting and being instructed by a human is naturally and so will not force that much HS and FF than typing. Writing by hand but being instructed by computer will lead to lower HS and FF scores especially in the online setting, because the computer forces less motivation. So the main effect of input condition depends on whether the instruction is given by a human or a computer: The difference of keyboard and handwritten answers will be higher if the instruction is done by human than if it was done by computer.

Finally we think, in addition to Atkinson and Birch's (1970) DoA, picture-position will have an influence on the yielded motive-score of each picture: Earlier pictures will evocate more HS or FF than later. As this effect also depends on the strength of motive, we think this effect is influenced by both input-condition and administration. So typing will cause more motive-related answers and lead to an increase of motive-scores, those pictures with typed answers will show a higher position-effect in that way that when answers are typed, the pictures on the first and last position will force more motive-related answers than when it is handwritten. But the stories wrote for pictures in the second position will have lower motive content when typed than when handwritten, because as assumed in the DoA there will be higher cycles in response to the high enforcement. For administration the same is expected. Administration by human experimenter will force more motives on the first and third picture, but less on the second comparing with those done by computer (Gruber, 2014).

3. Method

3.1. Design and Participants

For testing our hypothesis a 3 x 2 x 3 (picture-position [1, 2, 3] x input condition [hand, keyboard] x administration [human, computer, online]) mixed within/between subject design was used. So the three factors, which influence motive strengths and its components, can be separately manipulated. To assess the position-effect, the picture pairs consisting of a HS and a FF-picture, were not changed, which is most comparable to the origin TAT (Heckhausen, 1963). So each HS-picture was followed by an FF-picture, whereby the session started with a HS-picture (see table 1). For testing the difference of typed and handwritten answers a within-design was used, because taking the test again is a problem for projective tests like the TAT. People would try to write different stories comparing to the first session – not because they now write by hand or type, just because they have already seen the pictures before and projected their motives on it, preconditioned they did not change in the meantime (Lundy, 1985). As a position-effect is expected in DoA, there has to be a variation whether people type first or start writing with hand. So the first two pictures (one couple) have to be handwritten or typed and then the following four pictures have to be typed or handwritten (Gruber, 2014).

Table 1: Design of the study

Picture-Position	Administration		
	Experimenter	Computer	Online
A*- B*- C - D - E - F			
C*- D*- E - F - A - B			
E*- F*- A - B - C - D			
A - B - C*- D*- E*- F*			
C - D - E*- F*- A*- B*			
E - F - A*- B*- C*- D*			

Note: * pictures were typed, nonmarked pictures were written by hand.

Originally 140 people (101 female and 39 male) took part at several sessions. After the elimination of seven uncompleted and / or unserious-taken test-responses the data of 96 female and 37 male undergraduate students, age between 19 and 46 years (M = 22.76; SD = 3.90), remained. They were enrolled in different subjects at the Universität Regensburg in different semesters (M = 4.82; SD = 2.43) and had different experience in typing on the computer from none to high (0-4; M = 1.98; SD = 1.30). All of the participants were randomly assigned to one of the 18 conditions.

3.2. Materials
Materials were a questionnaire of demographic data (code, age, sex, semester, subject, graduation, and experience in typing), the six pictures of Heckhausen's TAT (1963), headphones, PC (Dell Optiplex 755) with keyboard, a writing sheet with pencil, a beamer and a clock.

3.3. Procedure
The people were recruited with fliers, posters, emails and within course lessons. Each session was held in a university computer room, lasted about 35 minutes and administered in small groups. Each room consisted of 16 to 26 PCs with a distance between the PCs about 0.70 meters.

3.3.1. Instruction via Computer
The experimenter shortly introduced the participants and distributed headphones. Then the subjects randomly got papers with a written instruction and the URL for the test. There was no further instruction by the experimenter; but she stayed in the room for answering questions and for having an eye on the participants. After completing biographical questions on the PC, the participants read the standardized instruction of Heckhausen (1963) on the computer and started the test. Each picture was displayed on the computer screen for 20 seconds. After this the participants had five minutes to answer four questions in response to the picture (one minute for each question and one minute for correction). These responses were made on writing sheets (handwrite-condition) or on the PC using the keyboard (typing-condition). After one minute an acoustical signal was given for each question and after five minutes the next picture automatically appeared. At the end of the experiment participants were given candies as a thank-you-gift.

3.3.2. Instruction via Experimenter
The procedure was similar to that in the instruction via computer-condition: the participants were also given a URL for the online test and writing sheets; but in this condition they got no headphones; the experimenter explained the test instruction orally, presented each picture via projector and measured the time-limit by a clock in a casual way, strictly following the instructions of Heckhausen (1963).

3.3.3. Complete online test
In the complete online test, the participants got sheets of papers and the link for the TAT as in 3.3.1. They were free to do the test wherever and whenever they want within a limit of two weeks. After they took the test, they throw their sheet of paper in a box before the instructor's room.

3.4. Analysis

Before analysing the stories were scored for the implicit achievement motive by two trained coders using the Heckhausen scoring-system (1963 with an additional category proposed by Breidebach, 2012), which allows separated coding of hope of success and fear of failure. Breidebach suggests a new category he called "sureness of success" (E_{SG}), which should be the pedant of failure in the FF category, so this aspect was also coded in this study. The inter-rater-agreement assessed with the a_d-coefficient by Kreuzpointner, Simon and Theis (2010) and Pearson correlations (given in brackets) was $a_d = .998$ for HS ($r = .90$) and $a_d = .998$ for FF ($r = .87$), which is in both cases above the 95% level. Also the intra-rater-agreement in a delay of four weeks was measured: for HS between $a_d = .998$ ($r = .82$) and $a_d = .999$ ($r = .95$) and for FF between $a_d = .998$ ($r = .82$) and $a_d = .999$ ($r = .91$). Being a very strict measure, the high a_d-coefficients indicate high objectivity.

The influence of administration condition on HS and FF was tested by three-way ANOVAs. The dependent variable therefore was the summed score of the three picture pairs, separated for HS and FF. So pair one (P1) includes the score from A and B, pair two (P2) consists of C and D, pair three (P3) contains E and F. If the administration condition would have an influence, a main effect should occur. The general influence for input-condition should get obvious in an interaction effect of input-type (typed first vs. handwritten first) with position-effect. If this effect is determined by type-experience this should be a statistical significant factor. The same analysis was done to find whether word-count differs in typed and handwritten answers. To check if HS and FF depend on word-count, a Pearson correlation was calculated.

To test the interaction of administration and input condition, three-way ANOVAs were calculated. The position-effect was assessed by several ANOVAs, whereby a simple position-effect is obvious in an interaction of the repeated factor "picture pair" and its position (two-way ANOVAs). A possible influence of administration or input-condition should get obvious in a further interaction (three-way ANOVAs) and post-hoc-tests.

4. Results

4.1. Administration and input

First the influence of the administration done by a human experimenter, computer or online on the score of hope of success and fear of failure was investigated (see figure 2).

Figure 2: Overall-score of hope of success (HS) and fear of failure (FF) depending on administration. Standard errors are represented in the figure by the error bars attached to each column.
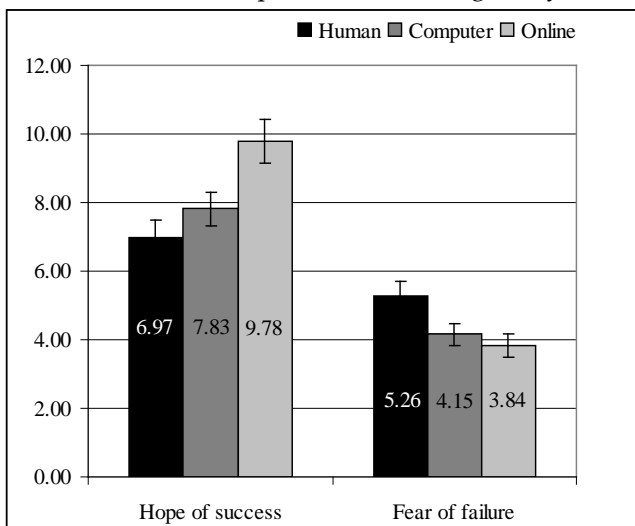
The overall mean-score of HS of each picture-pair is with 3.26 ($SD = 1.59$) in the online test session a bit higher than for the computer administrated test (2.59; $SD = 1.92$) and even for that with human experimenter ($M = 2.32$; $SD = 1.87$; $F (2, 130) = 6.32$, p <.01, $\eta_p = .09$). There was also a difference for FF: People administrated by human experimenter show significantly higher FF ($M = 1.78$; $SD = 1.33$) than people instructed by computer ($M = 1.38$, $SD = 1.10$) or in the onlinetest session (M = 1.28, $SD = 0.88$, $F(2, 130) = 4.20$, $p < .05$, $\eta_p = .06$).

Regarding input-condition it could be assessed that people generally wrote more words with keyboard (*M* = 183.26, *SD* = 32.28) than with hand (*M* = 148.02, *SD* = 51.61, $F_{(2, 130)}$ = 15.69, *p* = .00, η_p = .30) and that there is no statistical significant correlation between typed word-count with HS (*r* = .18, *n.s.*) and with FF (*r* = .15, *n.s.*). But there is a statistical significant difference of HS ($F_{(2, 133)}$ = 4.60, *p* < .05, η_p = .08) in that way, that people have higher HS scores for the first worked picture pair, when they wrote with hand (*M* = 2.88, *SD* = 1.54) than when they wrote with keyboard (*M* = 2.52, *SD* = 1.40). The score for FF ($F_{(2, 133)}$ = .82, n.s., η_p = .01) did not differ in this condition. Typing-experience showed no influence on this effect for hope for success ($F_{(2, 133)}$ = 2.71, *n.s.*, η_p = .08) as well as for FF ($F_{(2, 133)}$ = .82, *n.s.*, η_p = .01). When having a look at the interaction with administration it gets obvious that whether the test is instructed by computer or human instructor or online has no influence on HS ($F_{(2, 132)}$ = 0.30, *n.s.*, η_p = .01) or FF ($F_{(2, 132)}$ = 2.38, *n.s.*, η_p = .07), although the last one is a little effect with *p* = .06. In table 2 a short overview of these results will be given.

Table 2: Influence of input-condition and administration on hope of success (HS) and fear of failure (FF).

	Input							Administration									Input x Administration		
	Hand		Keyboard					Online		Computer		Human							
	M	SD	M	SD	F	p	η_P	M	SD	M	SD	M	SD	F	p	η_P	F	p	η_P
HS	2.88	1.54	2.52	1.40	4.60	.03	.08	3.26	1.59	2.59	1.92	2.32	1.87	6.32	.01	.09	0.30	.75	01
FF	1.32	1.06	1.48	1.14	.82	.37	.01	1.28	0.88	1.38	1.10	1.78	1.33	4.20	.02	.06	2.38	.06	07

4.2. Position

To evaluate the position-effect we tested first, whether the scores of FF and HS for each picture pair (consisting of one HS picture and one FF picture) change, when the picture are in different sort-order. Therefore ANOVAs with position as between-factor, the three scores of each motive as within-factor and the dependent variables HS and FF are calculated. So when position and picture change in the same way there must be a statistical significant interaction if there is a position effect. But there was no statistical significant interaction for HS ($F_{(4, 133)}$ = 1.24, *n.s.*, η_p = .03) or FF ($F_{(4, 133)}$ = 1.42, *n.s.*, η_p = .02), although they differently change over position (as obvious in figure 3). Not even a post-hoc analysis with the very liberal LSD-Test found any statistical significant changes between the picture pairs for HS or FF.

Figure 3: Scores of all three pairs depending on position for hope of success and fear of failure
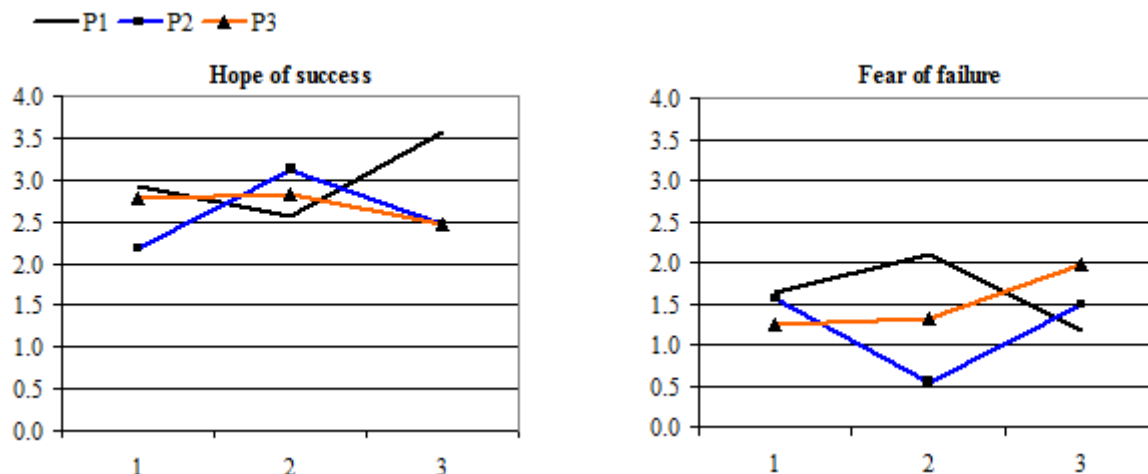
Note: P1 = pair one (picture A+B), P2 = pair two (picture C+D), P3 = pair three (picture E+F)

Next it was questioned whether a specific instruction or the input-condition could evoke a position effect (see table 3). But there was no statistical significant result neither for HS ($F_{(4, 133)}$ = .87, *n.s.*, η_p = .01) nor for FF ($F_{(4, 133)}$ = 1.09, *n.s.*, η_p = .05) when the instruction was given by human or computer. And there was also no statistical significant result for HS ($F_{(4, 133)}$ = 2.52, *n.s*, η_p = .08) or FF ($F_{(4, 133)}$ = .08, *n.s*, η_p = .01) when the answers were typed or handwritten.

Table 3: Influence of input-condition and administration on the position effect of hope of success (HS) and fear of failure (FF).

	pic x pos			pic x pos x adm			pic x pos x input		
	F	p	η_P	F	p	η_P	F	p	η_P
HS	1.24	.30	.02	.87	.48	.01	2.52	.08	.05
FF	1.42	.22	.02	1.09	.37	.04	.08	.76	.01

Note: pic = picture, pos = position, adm = administration.

5. Discussion

First we expected similar to Blankenship (2010) and Schultheiss and Pang (2007) a human instructor to evocate more social press and therefore the human-administrated test to generally force higher motive-score than the computer-based test and especially an online test without human instructor. But having a differentiated view on hope of success and fear of failure, HS was highest in the online test, without an influence of human instructor. Regarding FF the human-administrated test was found to evocate a higher score than the computer-based test in front of the instructor and in the online setting. An explanation of this result advanced Heckhausen (1963), who suggested FF being forced by an authority or at least a person who can give a negative evaluation of ones' achievement. So the kind of expected social press, which was expected by Schultheiss and Pang (2007), can be assumed as a component of FF and also changes the HS score.

Second it was assumed that, because nowadays people write more with keyboard and word-count generally influences nAch (e.g. Schultheiss et al., 2008; Hofer et al., 2010; Ricciutu, 1954), both motive-scores of HS and FF to be higher in the typed than in the handwritten condition. But only the fact, that people generally wrote more in the typed than in the handwritten condition, could be verified (see Blankenship & Zoota, 1998). Against our expectations the numbers of words had no influence on the scores of HS and FF. This could also depend on Heckhausens scoring-system, because compared to Winter (1993) not every sentence is scored only every paragraph. So the practical implication is, that the motive-scores of this measurement are not influenced by word-count and calculating a word-count-correction as given by Winter (1993) is not required. As a conclusion the expectation that people writing more and so having more chance to give a motive-relevant answer and to reach a higher motive-score had to be dropped. We did not even find HS and FF to be higher in the typed condition: Surprising and against our expectations people wrote more HS related answers with hand than with keyboard. The hypothesis experience in typing would explain differences in motive-scores of typed answers, could not be verified as well, mainly for the low correlations of word-count and the motive-scores of HS and FF.

Next we assumed an interaction effect of administration and input-condition in that way, that especially in the typed and human-administrated test situation the motive-scores of HS and FF will be high. This could not be verified either; there was only a small effect for FF. An explanation of this could be that the human-administration influences how handwritten and typed answers differ in motive-score and the human-administration mostly causes FF and a little HS. This also predicates for the quadripolar model of Covington and Roberts (1994) to see HS and FF as independent factors, which only work in combination to each other.

The hypothesis regarding the DoA has to be rejected as well. But we find some indices for the assumption of Blankenship (1987) that HS will show a typically cyclic course, when having a look at the interaction with input condition and position-effect: Handwritten answers showed more HS and so are a little more fitting to the DoA. Although the score of FF also depends on the levels of administration no administration x position-effect interaction could be attested, which is a little hint, that as Blankenship (1987) assumed DoA would fit only on HS, but this has to be evaluated with other groups like optimists and failure avoiders. Another limitation is that the pictures themselves differently force HS and FF so for example the third picture pair evocated mostly HS and less FF, while the second picture pair evocate more FF than HS. This different progress of the motivational components could also cause from the fact, that HS and FF are two different factors in that way that consummatory force decreases HS so that the instigating force of FF sets in and FF is activated. So this also influences the regarding to DoA expected cyclic course and as Smith (1992) wrote, the rank order of pictures is a very important aspect, which also and especially influences the total motive score.

6. Acknowledges

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Scientific Research Competencies of Prospective Teachers and their Attitudes toward Scientific Research

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ABSTRACT

Present study has been constructed to determine scientific research competencies of prospective teachers and identify the extent of effect of prospective teachers' attitudes toward scientific research and scientific research methods course on their research skills and attitudes towards research. This study has two dimensions: it is a descriptive study by virtue of identifying prospective teachers' research skills and attitudes toward research, also an experimental study by virtue of determining the effect of scientific research methods course on prospective teachers' skills and their attitudes toward research. In order to obtain the data related to identified sub-problems "Scale for Identifying Scientific Research Competencies" and "Scale for Identifying the Attitude toward Research" have been utilized. Data collection tools were applied to 445 prospective teachers. It has thus been concluded in this study that scientific research methods course had no significant effect in gaining scientific research competencies to prospective teachers and that this effect demonstrated no differentiation with respect to departments. On the other hand it has been explored that scientific research methods course had a negative effect onthe attitudes of prospective teachers toward research and that there was a differentiation to the disadvantage of prospective teachers studying at Primary Education Mathematics Teaching Department.

Keywords:
Prospective teachers, scientific research competencies, attitudes toward scientific research.

1. Introduction

Dating back to as early as the birth of mankind, there has been an unceasing attempt of construe and comprehend the environment and surrounding events, which in effect introduced a demand for producing scientific knowledge and developing research (Demirtaş, 2014). In modern age witnessing an increased demand and significance of scientific knowledge, there emerges a need for individuals generating and construing knowledge via employing the methods applied to reach scientific knowledge. Türkmen and Kandemir (2011) argue that this is only feasible by raising the kind of individuals who investigate, question, and construe knowledge and generate science via employing scientific research steps and principles. Sönmez (2008) defines science as, "the process of establishing a process on the basis of providing evidence with certain portions of fact and the compilation of dynamic knowledge attained at the end of this process".

Reaching scientific knowledge deemed to be the main determinant of personal and social life quality which can only be secured via implementing the kind of research methods compatible with the key principles of

research (Ural & Kılıç, 2005). Scientific research itself embodies the systematic and planned set of activities manipulated to obtain scientific knowledge (Karasar, 1994; Demirtaş, 2014; Can, 2013).

A closer inspection to the aforementioned definitions reveals that the focal point of science is mental processes, desire to know and presence of knowledge whilst the key objective of scientific research is to search, identify and construe the origins, causes and formation of the phenomenon observed in the universe and our surrounding (Sharp, Peacock, Johnsey, Simon, Smith, Cross et al., 2009).

As agreed, one of the key objectives of modern educational systems is to raise individuals who not merely consume knowledge but can also generate advanced knowledge reflecting their critical, questioning, creative and respectful attitude toward nature and humanity and the kind of individuals endowed with researcher, and scientific attitudes, behaviors and possessing the desire to share their knowledge with the rest of people. These are the kind of qualities that can be listed under scientific attitudes and behaviors (Karasar, 2007). As relevant literature is probed into, it is detected that such attitudes and behaviors are categorized as the most distinct qualities of modern man (Cafoğlu, 1998; Erdoğan, 1998; Genç, 2010). In order to generate scientific knowledge the foremost requirement is acquisition of scientific attitudes and behaviors (Erdem, 2012). Karasar (2007) claims that scientific attitudes and behaviors are investigating the kind of thoughts and behaviors facilitating problem solving, science generating or in a more comprehensive term, practicing of research techniques competencies.

Bökeoğlu and Yılmaz (2005) state that possessing scientific research skills and a positive attitude toward scientific research are inseparable constituents of rising as citizens that exhibit the necessities of modern age. As widely acknowledged, scientific research competencies and positive attitude toward scientific research should not be regarded as qualities of scientists aloneand science is not to be generated by scientists only. This competency and attitude must be valued as among the essential features of modern individuals (Köseoğlu, Tümay and Budak, 2008). In that sense one of the most vital tasks of educational institutions is to render contribution in developing scientific perspective, attitude and behaviors of citizens.

There is an urgent need to apply the kind of curricula applicable to developing scientific research skills and positive attitude toward scientific research, but the number of such programs is far below expectations since these programs can be applicable in class only to the extent of perceptions and application skills of teachers, who are the actual implementers of curriculum. Accordingly it is a must to train the kind of prospective teachers, the actual implementers of curriculums aimed at developing scientific research skills of learners and positive attitude toward scientific research, who are personally endowed with scientific attitudes and behaviors (Türkmen and Kandemir, 2011). Irrespective of this agreement a number of relevant literature studies manifested that teacher's lack adequate knowledge on scientific process skills, which in effect culminated the emergence of students possessing low levels of scientific process skills (Karslı, Şahin and Ayas, 2009; Türkmen and Kandemir, 2011). Türkmen and Kandemir (2011) in their work attested that teachers lack adequate knowledge on scientific process skills hence students are raised as individuals with low levels ofscientific process skills. Echoing results can be traced to the studies conducted by Karslı, Şahin and Ayas (2009), Hazır and Türkmen (2008).

As the relevant literature on the requirements of teaching profession and qualities of teachers is explored, there is a certain emphasis on the quality of possessing research knowledge and skills (Kılıç and Acat, 2007; Kıncal, 2004; Şahin, 2011; YOK, 1999). Based on the results obtained from an abundance of studies revealing the determinant effects of teachers' attitudes, behaviors and skill levels on students' performance (Kılıç and Acat, 2007; Oruç and Ulusoy, 2008; Şahin and Altınay, 2009) it is safe to argue that teachers of modern education are undoubtedly required to possess adequate levels of knowledge on scientific researches, skills and positive attitudes. In addition, it is of vital importance to train the teachers, who are the key players in gaining research culture and scientific perspective to society, endowed with a positive attitude toward researches. In an experimental study conducted by Demirbaş and Yağbasan (2005) it is stated that teachers' role-modelingis a practical method in gaining scientific attitudes and skills to students.

In line with this framework, the necessity to integrate into teacher-training curricula the kind of courses that develop a research culture has risen as a requirement, since teachers can only transfer effectively the type of knowledge, skills and attitudes they themselves already hold. Accordingly in teacher-training programs, a set of alterations have been made to gain research competencies and positive attitude toward research. To

address this general objective, courses titled as "Research Techniques", "Research Methods in Education" and "Research Methods" were integrated into teacher-training programs between years 1982-1997,but in 1997 these courses were crossed. During the 2006-2007 academic term however, they were reintegrated into the curriculums to develop research skills of prospective teachers (YOK, 2007a). It is envisaged that prospective teachers having taken this course shall develop an awareness on the structure of scientific research and scientific methods; generate new perspectives on these methods; identify the problem; make a decision on research model; designate the universe and sampling; develop data collection, analysis, and interpretation skills (YOK, 2007b). In terms of raising teachers possessing scientific research competencies and positive attitudes toward scientific research, it is of grave importance to make the most of scientific research methods course.

Studies in relevant literature can be grouped under two categories: studies to identify scientific research competencies of teachers and prospective teachers and analysis of such competencies with respect to several variables (Demircioğlu, 2006; Şahin and Altınay, 2009; Tekbıyık and İpek, 2007; Büyüköztürk, 1999; Yakar, 2014; Akar, 2007; Nartgün, Uluman, Akın, Çelik and Çevik, 2008; Türkmen and Kandemir, 2011)and studies on the quality of scientific research methods (Nartgün, et al., 2008; Kurt et al. 2011; Tay, Demirci-Güler and Taşdemir, 2009). However in relevant literature there are limited numbers of studies aimed at identifying teachers' or prospective teachers' attitude toward scientific researches (Korkmaz, Şahin and Yeşil, 2011).

For the prospective teachers, possessing scientific research skills and positive attitude toward scientific research bears critical importance in utilizing and transferring such skills during their teaching career (Taşdemir, 2013). In relevant literature no studies have been found which analyze prospective teachers' scientific research skills and attitudes collectively with the effects of scientific research methods on the particular skills and attitudes. Identifying prospective teachers'scientific research competencies and attitudes toward scientific research and detecting the effectiveness of scientific research methods can also provide vital contributions to raising researcher-teachers of the future.

In line with this framework the main objective of present study is not only to identify prospective teachers' scientific research competencies and attitudes toward scientific research, but also the effect of scientific research methods course on the research skills of prospective teachers and their attitudes toward research. To address this objective the study aims to seek answers for below-listed questions:

1) What is the level of prospective teachers' scientific research competencies and their attitudes towardresearch?
2) Do prospective teachers' scientific research competencies change significantly with respect to department variables?
3) Does prospective teachers' attitude toward research change significantly with respect to department variables?
4) What is the effect of Scientific Research Methods course on the scientific research competencies of prospective teachers?
5) What is the effect of Scientific Research Methods course on prospective teachers' attitude toward research?
6) Does the effect of Scientific Research Methods course on the scientific research competencies of prospective teachers vary significantly with respect to department variables?
7) Does the effect of Scientific Research Methods course on the attitudes of prospective teachers toward research vary significantly with respect to department variables?

2. Method

2.1. Research model

In present study descriptive and experimental research models have been employed in tandem. This study has two dimensions: it is a descriptive study by virtue of identifying prospective teachers' research skills and attitudes toward research and it is an experimental study by virtue of determining the effect of scientific research methods course on prospective teachers' skills and their attitudes toward research. As regards experimental dimension of the study, pre-test final-test pattern with no control group has been adopted.

2.2. Universe of the study and sampling

With respect to descriptive dimension of the study, students in Balıkesir University, Necatibey Faculty of Education and taking "Scientific Research Methods" course have been selected as the universe of this study. Data collection tools have been applied to 445 prospective teachers randomly selected on the principle of reflecting the universe by the sampling. However, the scales completed by 7 prospective teachers were excluded from the analysis due to some missing personal information. Information on the sampling is listed as below:

Table 1. Universe-sampling Table

Department	Universe	Sampling	Representation rate (%)
Dept. of Teaching Physical Sciences	120	64	53,3
Dept. of Teaching Turkish	130	53	40,8
Dept. of Teaching Computer Education and Instructional Technologies	123	56	45.5
Primary Educatio Mathematics Teaching	169	51	30,2
Classroom Teaching	122	61	50
Teaching Social Sciences	130	63	48,5
Teaching English	95	50	52,6
Preschool Teaching	53	47	88,7
Total	942	445	47.2

Experimental dimension structured to identify the effect of "Scientific Research Methods" course on prospective teachers' research competency and their attitudes toward research has been conducted during 2013-2014 Academic Year Fall Term among students in Dept. of Teaching Physical Sciences, Primary EducationMathematics Teaching, Dept. of Teaching Turkish, Teaching Social Sciences and Dept. of Teaching Computer Education and Instructional Technologies(CEIT) having taken"Scientific Research Methods" course.

2.3. Data collection

In order to obtain the data relevant of identified sub-problems, "Scale for Identifying Scientific Research Competencies" and "Scale for Identifying the Attitude toward Research" have been utilized.

Developed by Doğan, Albayrak and Acar (2007),"Scale for Identifying Scientific Research Competencies" consists of 54 items. Scale items are graded in five-point Likert scale as "Always, Mostly, Occasionally, Rarely, Never". Grading of scale is; Always= 5, Mostly= 4, Occasionally= 3, Rarely= 2, Never= 1. This data collection tool of Cronbach Alpha internal consistency coefficient was measured as .90 (Doğan, Albayrak and Acar, 2007) and revealed .89 Cronbach Alpha internal consistency coefficient in present study. Since this is a value between "$0.80<\alpha<1.00$" it is identified that the scale is "highly reliable" (Kalaycı, 2006).

In order to designate prospective teachers' attitudes toward research, "Scale for Identifying the Attitude toward Research" adapted into Turkish by Çetin, İlhan and Kinay (2012) has been employed. In the process of adapting into Turkish the scale originally developed by Papanastaiou (2005),the first step has been to analyze linguistic equivalence of the scale. Between the Turkish and English forms of the scale a positive-way, strong and significant relation was detected. Construct validity of the Turkish form of the scale was examined by Exploratory Factor Analysis (EFA). EFA showed that unlike the original form with 5 factors, the scale had a four-factor structure. Cronbach Alpha internal consistency coefficient of the scale was found as.88. Based on these findings it was concluded that the scale was a valid and reliable tool of measurement to designate Turkish college students' attitudes toward research (Çetin, İlhan and Kinay, 2012). In present

study, Cronbach Alpha internal consistency coefficient of data collection tool was measured as.93. Since this was also a value between "0.80<α<1.00" the scale was identified as a "highly reliable" scale (Kalaycı, 2006).

As regards descriptive dimension data collection tools were applied to identified sampling. As regards experimental dimension on the other hand, it was conducted at the beginning and final of the course-teaching-process. During the application stage, 306 students took the pre-test and 278 students took the final test. However, since 43 students having taken the pretest did not take the final test, and 1o students having taken the final test but not the pretest, they were excluded from the analysis. Additionally 2 scales from the pretest and 7 scales from the final test were excluded from the analysis due to some missing personal information. Numeric data on the study group regarding the experimental dimension of researchare as given below.

Table 2. Numeric Data on Study Group

Department	Pre-test	Final-test
Teaching Social Sciences	44	44
Primary Education Maths Teaching	72	72
Teaching CEIT	45	45
Dept. of Teaching Turkish	34	34
Dept. of Teaching Physical Sciences	66	66

2.4. Data analysis

"Scale for Identifying Scientific Research Competencies" consists of 54 items. Scale items are graded in five-point Likert scale as "Always, Mostly, Occasionally, Rarely, Never". Grading of scale is; Always = 5, Mostly = 4, Occasionally = 3, Rarely = 2, Never= 1. The scores reflecting prospective teachers' research competencies have been interpreted by comparing the identified values with limit intervals. Since utilized scale was with 5 grades and 4 intervals (4:5=0.8) limit intervals were scored within 0.8 interval from 1 to 5 (1.00-1.80 "Never", 1.81-2.60 "Rarely", 2.61-3.40 "Occasionally" 3.41-4.20 "Mostly" and 4.21-5.00 "Always"). In the scale, inverse scoring was conducted in the 25, 29, 30-39 intervals and item 46.

"Scale for Identifying the Attitude toward Research" was constructed in 7-point Likert type and responses of participants were scored as; 1 "I absolutely disagree", 2 "I disagree", 3 "I partially disagree", 4 "I am undecided", 5 "I partially agree", 6 "I agree" and 7 "I absolutely agree".The scores reflecting prospective teachers' attitudes toward research have been interpreted by comparing the identified values with limit intervals. Since utilized scale was with 7 grades and 6 intervals (6:7=0.85) limit scores were scored within 0.85 interval from 1 to 7 (1.00-1.85 "I absolutely disagree", 1.86-2.71 "I disagree", 2.72-3.57 "I partially disagree", 3.58-4.43 "I am undecided", 4.44-5.29 "I partially agree", 5.30-6.15 "I agree" and 6.16-7.00 "I absolutely agree"). In the scale inverse scoring was conducted in the 1, 6, 7, 9-12 intervals and items 16, 18, 23, 25, 26, 28. and 32.

As a result of Kolmogorov-Smirnov test applied to detect if data obtained for descriptive dimension exhibited a normal distribution, it was deemed appropriate to use parametric tests in the analysis of data revealing prospective teachers' scientific research competencies($z=1.096$; $p=.181$; $p>.05$). As regards the attitude toward research, Kolmogorov-Smirnov test indicated that in the analysis of data it is more appropriate to apply nonparametric tests ($z=1.594$; $p=.012$; $p<.05$). In the identification of prospective teachers' scientific research competencies and attitudes toward research, arithmetic mean and standard deviation scores were employed. In order to designate if research competencies varied significantly with respect to department variable "One-Way ANOVA"; and in order to detect within which groups significant differentiation occurred, "Scheffe" test was employed. To see whether attitudes significantly differentiated, "Kruskall Wallis-H analysis" was conducted. To identify the originating source of groups explaining the different attitudes among prospective teachers, Mann-Whitney U test was performed.

As a result of Kolmogorov-Smirnov test applied to detect if data obtained for experimental descriptive dimension exhibited a normal distribution, in the analysis of pre-test (z=4.789; p=.000; p<.05) and final-test (z=6.109; p=.000; p<.05) scores of prospective teachers'scientific research competencies non-parametric tests shall be employed. In the analysis of pre-test (z=1.250; p=.088; p>.05) andfinal-test (z=6.109; p=.971; p>.05) scores obtained from Kolmogorov-Smirnov test to detect their attitudes toward research, parametric tests were applied. To detect the effect of scientific research methods course on the scientific research competency of prospective teachers and to see if a significant differentiation existed between pre-test and final-test scores of each group, "Wilcoxon signed ranks" analysis for dependent groups was performed. To detect their effect on the attitude toward research and see if a significant differentiation existed between pretest and final test scores of each group,"t-test" for dependent groups was conducted. To see if final test scores related to prospective teachers' scientific research competencies varied significantly with respect to department variable "Kruskall Wallis-H analysis" was applied. To identify if final test scores related to prospective teachers' attitudes varied significantly with respect to department variable"One-Way ANOVA" analysis was put into practice. In the interpretation of collected data, a comparison was made between the experimental and descriptive results to reach indirect suggestions on the permanency of skills and attitudes.

3. Results

Results related to Prospective teachers' scientific research competencies and their attitudes toward scientific research are as manifested in Table 3.

Table 3. Prospective Teachers' Scientific Research Competencies and Their Attitudes toward Scientific Research

	N	Min.	Max.	$\overline{X}$	S
Scientific research competency	438	2.23	5.00	3.48	.36
Attitudes toward scientific research	438	2.00	7.00	5.33	.87

As demonstrated in Table3, with a .36 standard deviation the arithmetic mean of prospective teachers' views on their scientific research competencies was detected as $\overline{X}$=3.48. According to the obtained value prospective teachers"Mostly" exhibit the kind of behaviors indicating scientific research competency. With a .87 standard deviation the arithmetic mean of prospective teachers' views on their attitude toward research was detected as $\overline{X}$=5.33. Based on this score it can be argued that prospective teachers' perception on their attitude toward research is in "I agree"level.

Table 4. Prospective Teachers' Scientific Research Competencies With Respect to Department Variable

	Sum of squares	Sd	Mean square	p	Significant difference
Intergroup	3.52	7	.50	.00	e>d; e>h
Intra-group	54.33	430	.13		
Total	57.84	437			

Obtained findings show that prospective teachers' scientific research competencies with respect to department variable can be ordered from the highest to the lowest as: CEIT (e; $\overline{X}$ = 3.68), physical sciences (a; $\overline{X}$ = 3.52) and social sciences (g; $\overline{X}$ = 3.52), preschool (f; $\overline{X}$ = 3.48), primary education mathematics (b; $\overline{X}$ = 3.45), Turkish (c; $\overline{X}$ = 3.42), English (h; $\overline{X}$ = 3.41) and classroom teaching (d; $\overline{X}$ = 3.37). In a different saying it is safe to claim that behaviors indicative of scientific research competencies are occasionally exhibited by

classroom teaching prospective teachers ($\overline{X}$=3.37) while mostly exhibited by prospective teachers from the remaining departments. Table 4 points that there is significant differentiation among departments (p=.000, p <.05). This difference is in favor of prospective teachers from CEIT department (e; $\overline{X}$ = 3.68), English (h; $\overline{X}$ = 3.41) and classroom teaching (d; $\overline{X}$ = 3.37) department students.

Table 5. Prospective Teachers' Attitude toward Scientific Research With Respect To Department Variable

Department	N	Mean rank	sd	KWH	p	Significant difference
a.Teaching Physical Sciences	64	274,96	7	37.003	.00	a>b; a>c; a>d; a>f; a>h;
b.Primary Education Mathematics Teaching	50	192,56				e>b; e>c; e>d; e>f; e>h;
c. Teaching Turkish	52	175,34				g>c; g>d
d. Classroom Teaching	61	184,51				
e. Teaching Computer Education and Instructional Technologies CEIT	55	268,25				
f. Preschool teaching	47	214,23				
g. Teaching social sciences	59	237,58				
h. Teaching English	50	194,07				

Findings of Table 5 reveal that as prospective teachers' attitude toward scientific research with respect to department variables analyzed the highest mean rank belongs to Teaching Physical Sciences students (a; $\overline{X}$ =274,6), whilst the lowest mean rank belongs to students in Teaching Turkish department (c; $\overline{X}$ =175,34). As manifested prospective teachers' attitude toward scientific research with respect to "department" variable differs significantly (KWH=37.003; p=.000; p<.05). A significant difference was detected among the attitudes of prospective teachers studying in the Dept. of Teaching Physical Sciences, Primary Education Mathematics Teaching, Dept. of Teaching Turkish, Classroom Teaching, Preschool Teaching and Teaching English (p<.05). A statistically significant differentiation was measured between prospective teachers in CEIT, Primary Education Mathematics Teaching, Classroom Teaching, Preschool Teaching, Dept. of Teaching Turkish and Teaching English; prospective teachers in Department of Social Sciences and Dept. of Teaching Turkish and Classroom Teaching (p<.05). This finding can be interpreted as evidencing the deduction that prospective teachers'attitude toward scientific research varies with respect to their department.

Table 6. Comparison of Pre-Test and Final-Test Scores of Prospective Teachers' Scientific Research Competencies

Final-test Pre-test	N	Mean rank	Rank sum	z	p
Negative rank	136	110.59	150040.0	1.684*	.09
Positive rank	125	102.02	19151.0		
Equal	0				

*Based on negative ranks

As can be witnessed in Table 6, between the scores prospective teachers had before scientific research methods course and the score they receive at the end of course there is a difference in favor of final-test scores but this difference is not significant (z=1.684; p=.092; p>.05). According to these results it can be argued that scientific research methods course has no significant effect in gaining scientific research competencies to prospective teachers.

Table 7. Comparison of Pre-Test and Final-Test Scores of Prospective Teachers' Attitude toward Research

Attitudes toward scientific research	N	$\overline{X}$	S	sd	t	p
Pre-test	261	5.41	.38	260	-38.09	.00
Final-test	261	3.42	.77			

Table 7 displays that scientific research methods course has a negative effect on prospective teachers' attitudes toward research (t= -38.094, p=.000, p <.05). Before the application prospective teachers' previous mean score ($\overline{X}$=5.41) of their attitude toward research significantly regressed ($\overline{X}$=3.42) after taking the course. Correlation between pre-testand final-test scores is .039. However this finding is not indicative that prospective teachers with higher pre-test score does not necessarily receive a high final-test score or prospective teachers' with low pre-test score does not necessarily receive a low final-test score. Nonetheless it indicates that their attitude toward research is somehow affected.

Table 8. With Respect to Department Variable the Effect of Scientific Research Methods Course on Prospective Teachers' Scientific Research Competencies

Department	N	Mean rank	χ^2	p
a. Dept. of Teaching Physical Sciences	66	133.50	1.314	.86
b.Primary Education Mathematics Teaching	72	126.40		
c.Dept. of Teaching Turkish	34	123.15		
d. CEIT	45	132.01		
e. Teaching Social Sciences	44	139.81		

As the mean ranks of groups in Table 8 are examined; the highest mean rank belongs to the final test scores of prospective teachers in department of Teaching Social Sciences ($\overline{X}$=139.81), while the lowest mean rank belongs to the final test scores of prospective teachers in Dept. of Teaching Turkish ($\overline{X}$=123.15). According to these findings no significant differentiation exists among final-test scores related to the effect of scientific research methods course on prospective teachers' scientific research competencies with respect to department variable (χ^2=1.314; p=.859; p>.05).

Table 9. With Respect to Department Variable the Effect of Scientific Research Methods Course on the Attitudes of Prospective Teachers toward Scientific Research

	Sum of squares	Sd	Mean square	F	p	Significant difference
Intergroup	4.59	4	1.15	8.68	.00	a<b, a<c, a<d, a<e
Intragroup	33.85	256	.13			

| Total | 38.44 | 260 |

As obtained findings reveal the highest attitude level pertains to prospective teachers in the department of Teaching Social Sciences ($\overline{X}$ =3.56), while the lowest attitude level pertains to prospective teachers in Primary Education Mathematics Teaching department ($\overline{X}$ =3.21). Table 9 also shows that there is significant differentiation with respect to departments (p=.000, p <.05). This difference can be seen in favor of prospective teachers from department of Teaching Social Sciences (b; $\overline{X}$ = 3.56), Dept. of Teaching Turkish (c; $\overline{X}$ == 3.53), CEIT (d; $\overline{X}$ == 3.47) and Dept. of Teaching Physical Sciences(d; $\overline{X}$ == 3.45) and Primary Education Mathematics Teaching(a; $\overline{X}$ = 3.21).

4. Discussion

In present study structured to identify prospective teachers'scientific research competencies and attitudes toward scientific research and the effect of scientific research methods course on their research skills and research attitudes. It has been detected that prospective teachers' "Mostly" exhibited the kind of behaviors indicative of scientific research competency and their attitude toward research was in "I agree " level. On the other hand a study conducted by Büyüköztürk (1999) revealed that participant teachers lacked adequate level of research competencies and similarly a study by Türkmen and Kandemir (2011) posited that teachers lacked adequate level of theoretical knowledge on scientific process skills. The incongruity between the results obtained from studies with similar motives may be attributed to the sampling and timing incompatibility between studies.

Another finding of current study is that the kind of behaviors indicative of scientific research competencies were, compared to prospective teachers in Teaching English and Classroom Teaching, significantly more widely adopted by CEIT prospective teachers. In terms of attitudes toward scientific research, prospective teachers studying in Dept. of Teaching Physical Sciences possessed significantly higher levels of positive attitude compared to prospective teachers from other departments. Akar (2007) in his study manifested that prospective teachers in Classroom Teaching department lacked high levels of scientific process skills. Similar findings on the attitude toward scientific research were also detected in Yakar's (2014) study and it was concluded that pre-service training that prospective teachers in Dept. of Teaching Physical Sciences receive had a positive effect in developing their scientific process skills.

It has been concluded in present study that scientific research methods course posits no significant effect in gaining scientific research competencies to prospective teachers and that this effect showed no difference with respect to departments and on the contrary the course negatively affected prospective teachers' attitudes toward research and that there occurred a difference to the disadvantage of prospective teachers in Primary Education Mathematics Teaching. On the other hand as regards self-competency. Nartgün et al. (2008) identified a difference in favor of prospective teachers having taken the course. In the study of Büyüköztürk (1999) it was manifested that prospective teachers having taken competency-relevant courses, in comparison to the ones not taken the course, proved to be more efficient in research practices. The discrepancy in the results of studies conducted for similar motives might be explained with the differences of research competency related courses in the process dimension.

5. Conclusion and Recommendations

It has been concluded at the end of study that prospective teachers' level of exhibiting the kind of behaviors indicative of scientific research competency was in "Mostly" and their attitudes toward research was in "I agree"level. It has also been detected that behaviors indicative of scientific research competency were significantly more widespread among CEIT (Computer Education and Instructional Technologies) prospective teachers compared to prospective teachers from departments of English and Classroom Teaching and as regards their attitudes toward scientific research, prospective teachers studying in Department of Teaching Physical Sciences held further positive attitudes than the prospective teachers studying in different departments. It has thus been concluded in this study that scientific research methods

course had no significant effect in gaining scientific research competencies to prospective teachers and that this effect demonstrated no differentiation with respect to departments. On the other hand it has been explored that scientific research methods course had a negative effect on the attitudes of prospective teachers toward research and that there was a differentiation to the disadvantage of prospective teachers studying at Primary Education Mathematics Teaching Department.

Based on the deduction that attracting the teacher to research process and allowing personal integration to research activities is the pivotal factor in perpetuating learning activity, it is safe to argue that instead of transferring theoretical knowledge alone more emphasis should be rendered to practice stagein gaining research skills to prospective teachers. Accordingly it becomes feasible to instill the essentials of scientific research methods course and the kind of settings favorable to put into practice their theoretical knowledge could be arranged for prospective teachers. By associating the context of scientific research methods course with real life, the kind of studies in which prospective teachers may utilize their course learning can be designed in the future. Present study could be repeated among wider samplings and varied groups and to obtain more elaborate data, it could be patterned on the basis of qualitative research methods.

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Tertiary Students' Entrepreneurship Learning Socialization: Factor Analysis and Structural Equation Modeling

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ABSTRACT

This study examines 728 tertiary students' entrepreneurship learning socialization and its influencing factors to serve as a school reference for the development of internship and entrepreneurship education. The results show that students' internship experience has a significant direct effect on entrepreneurship learning socialization, and entrepreneurship intention has a significant effect on entrepreneurship learning socialization through internship experience. The influence pattern and empirical data of entrepreneurship intention and internship experience on entrepreneurship learning socialization has a good fit. This paper gives an insight from Taiwan tertiary institutions about entrepreneurial learning socialization of students and contributions to them. We describe the development of the influencing factors, discuss its implications for entrepreneurship and internship education, and finally offer suggestions for further entrepreneurship education development.

Keywords:
Tertiary students, entrepreneurship learning socialization, internship experience, entrepreneurship intention

1. Introduction

Internship education is important issues that enhance student employment and entrepreneurial. Students learning practical knowledge, inspire positive work attitude, and employment will through workplace internship (Alpert, Heaney & Kuhn, 2009). As the domestic unemployment climbs, employment-oriented tertiary education programs urgently need to find the teaching resources for internship and entrepreneurship education in Taiwan. The difficulty currently faced by tertiary students in their learning careers cannot be solved with a confinement to school internship (Chou, 2010; Wu, 2011). Tertiary institutions educate and instruct learners to acquire high levels of knowledge and skills and deliver learning enhanced students' employability (Hamilton & Tee, 2009; Sweitzer & King, 2013).

Student acquired internship outcomes also house tertiary-learned skills (internship behavior, career choice goals, outcome expectations), and these may be linked into business-deployed, tertiary student skills, and into the relevant business types where the graduate students often find their initial internship (Gokuladas, 2010; Liu, Xu & Weitz, 2011; Shafie & Nayan, 2010). Internship education plays the role of helping to reduce the unemployment rate in a country. Entrepreneurship learning socialization explores the students' internship experience and learning experience in the internship curriculum (Dupre & Williams, 2011; Fugate, Kinicki & Ashforth, 2004).

Socialization is the process by which persons learn the ways of society or social groups so that they can function properly within it or with them, and the process by which persons acquire knowledge, skills and dispositions that make them more or less able members of their society (Ambrož, 2015). Therefore individuals in general and youth in particular can significantly improve their employability through continuous education and learning. Through this entrepreneurship learning, they can easily adapt to the dynamic and turbulent external environment and maintain their current jobs, get promoted, or move to new jobs within or without the organization or move out of paid employment altogether to start new business ventures. Employment can be a result of the education an individual has acquired in the following ways. First, the type of education received might address the manpower needs of the economy. Secondly, the type of entrepreneurship and internship education influences the beliefs, attitudes, expectations, and values of the individual being educated (Ambrož, 2015; Apolloni, Galliani, Zizzo, Epifania, Crosta & Cesareo, 2013). Thus, if the education excites and fosters correct beliefs, attitudes, realistic expectations and responsible behavior, it causes an individual to pass opportunities for self-employment and formal employment.

Some research found students' experiences of learning entrepreneurship intention and internship experience provided them with chances to learn new internship skills, which may be helpful for their future self-employment (Dupre & Williams, 2011;Liu, Xu & Weitz, 2011; Misra & Mishra, 2011). Entrepreneurship intention are defined as follows: Attitude towards self-employment is the difference between perceptions of personal desirability in becoming self-employed and organisationally employed (Telander & Tramayne, 2011; Tomlinson, 2010). It is best predicted by attitudes towards the behaviour, subjective norms and perceived behavioural control. Research suggests that internship experience is important to affect internship learning result. It is positively related to students' self-efficacy, choice goals, and outcome expectations in contexts that can be characterized as complex, dynamic, and inherently uncertain (Edvardsson & Alves, 2010; Gault, Leach & Duey, 2010; Hoekstra, 2011).

From a theory of social cognitive career development point of view, the readiness to perform a behavior to become internship experiencehas been depicted as actively ambition of internship (Brown, Lent, Telander & Tramayne, 2011; Gokuladas, 2010). The availability of a validated instrument to measure industry vision, labor market, work requirement and academic achievement towards internship experience could be of much help (Hoekstra, 2011). The entrepreneurship education support of such exposure to career guidance has channels their mind to prefer employment over being an employer. Students who are exposed to entrepreneurship education ought to have more favorable views of small businesses as projected in their course of study than their to guidance and counseling teachers. It is likely then to observe that turning the knowledge gain in their entrepreneurial course by student requires proper guidance and counseling should be exposed to career guidance to build entrepreneurship intentions. Greater efforts should be placed in enhancing the attractiveness of entrepreneurship within the educational system thorough entrepreneurial learning socializaiton.

2. Purposes of this study

The paper, Analysis of factors in tertiary students perceived entrepreneurship intention and entrepreneurship learning socialization, using internship experience as a mediator variable. The purposes of this study are to address the 2 following issues.

1. There is no significant correlation between tertiary students' entrepreneurship intention, internship experienceand entrepreneurship learning socialization.
2. Influence models of tertiary students' entrepreneurship intention, internship experience, and entrepreneurship learning socialization fit the data collected by this study.

3. Methodology

3.1 Subjects

This study treats students from tertiary as the population, and adopts random sampling and cluster sampling for survey. A total of 728 valid samples were collected.

3.2 Measures

A 40-item survey questionnaire was developed to measure participants' entrepreneurship intention, internship experience, and entrepreneurship learning socialization. The research tool is a "Questionnaire of Factors Which Influence Tertiary Students' Entrepreneurship Learning Socialization". The questionnaire includes entrepreneurship intention scale, internship experience scale and entrepreneurship learning socialization scale (Edvardsson & Alves, 2010; Hoekstra, 2011). The scales' factors, number of questions reliability and validity are shown in Table 1.

The 'Questionnaire of Influence Tertiary Students' Entrepreneurship Learning Socialization' was reviewed by five experts for subject contents' suitability to ensure the scales' expert validation. Six students were invited to answer the questionnaire to enhance the validity of the scale's contents. In addition, six tertiary schools were selected for a pre-test, and 124 students were selected as the pre-test objects in total. The scales used in this study are in self-assessment form, and a Likert 5-point scale is used as the scoring method. There are five levels of choices from 'agree' to 'do not agree;' five equal portions of 5, 4, 3, 2 and 1 are distinguished according to the extent of agreement, and 5 points, 4 points, 3 points, 2 points and 1 point are given in this order. The higher the score an individual receives, the larger extent of agreement the individual has.

Table 1. An Overview of Factors, Number of Questions, Reliability and Validity for Tertiary Students' Entrepreneurship Intention, Internship Experience and Entrepreneurship Learning Socialization Scale

Entrepreneurship intention Scale				Internship experience Scale				Entrepreneurship learning socialization Scale			
Factor name	*No.*	*Cronbach α*	*Factor loading*	*Factor name*	*No.*	*Cronbach α*	*Factor loading*	*Factor name*	*No.*	*Cronbach α*	*Factor loading*
Goal orientation	4	.90	23.18%	Industry vision	4	.91	22.49%	Entrepreneurial Self-efficacy	4	.90	23.98%
Entrepreneurial skill	4	.88	22.561%	Labor market	4	.88	20.51%	Entrepreneurial alertness	4	.89	22.56%
Entrepreneurial ability	4	.86	19.22%	Work requirement	4	.89	19.23%	Outcome expectations	4	.88	19.78%
Total reliability Cronbach α	.90			Total reliability Cronbach α	.91			Total reliability Cronbach α	.90		
Accumulated explained variance			64.91%	Accumulated explained variance			62.23%	Accumulated explained variance			66.32%

3.3 Data analysis

In processing the survey data used in this study, the collected questionnaires were coded, and Statistical Package for Social Science (SPSS version 12.0) and linear structural analysis (LISREL version 8.5) were used to verify the correlation among the factors of 'entrepreneurship intention,' 'internship experience' and 'entrepreneurship learning socialization' variables and their effects in order to achieve the purpose of this study. In this study, the statistical test level $\alpha = 0.05$.

4. Results

The empirical results of tertiary students' entrepreneurship learning socialization are shown in Figure 1, and are analyzed as follows: The estimated value of the direct affecting parameter between entrepreneurship

intention and internship experience is 0.69 (t = 5.12, p<.05). This means that entrepreneurship intention has a significant effect on internship experience.

The estimated value of the direct affecting parameter between entrepreneurship intention and entrepreneurship learning socialization is 0.45 (t = 4.78, p>.05). This means that 'entrepreneurship intention' does not necessarily have a significant effect on entrepreneurship learning socialization. The estimated value of the direct affecting parameter between internship experience and entrepreneurship learning socialization is 0.88 (t = 4.92, p<.05). This means that internship experience has a significant effect on entrepreneurship learning socialization.

In summary, in this study of tertiary students' entrepreneurship learning socialization and its influence pattern, entrepreneurship intention has a significant effect on internship experience, but does not have a significant effect on entrepreneurship learning socialization. Internship experience has a significant effect on entrepreneurship learning socialization.
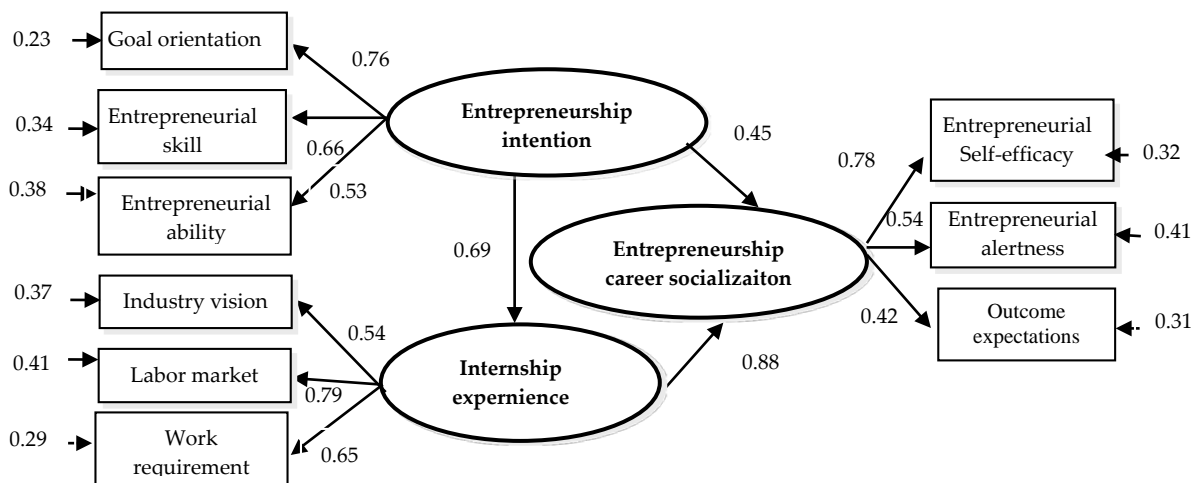

Figure 1. Path of Tertiary Students' Entrepreneurship Learning Socialization

5. Discussion

Students' internship experience has a significant direct effect on entrepreneurship learning socialization, and entrepreneurship intention has a significant effect on entrepreneurship learning socialization through internship experience. The influence pattern and empirical data of entrepreneurship intention and internship experience on entrepreneurship learning socializationhas a good fit. The influence effects of entrepreneurship intention, internship experience, and entrepreneurship learning socialization shows that for tertiary students, the influence of entrepreneurship intention on entrepreneurship learning socialization comes mainly through their awareness of internship experience. In addition, internship experience has a direct and significant effect on entrepreneurship learning socialization. From the influence of entrepreneurship intention, internship experienceand entrepreneurship learning socialization, we can clearly see that compared with entrepreneurship intention, internship experiencehas a greater influence on entrepreneurship learning socialization (Edvardsson & Alves, 2010; Hoekstra, 2011; Nam, Yang, Lee, Lee, & Seol, 2011).

Regarding the test results, according to the goodness of fit test standard by Hair et al, the model in this study has a good overall fit (Bentler, & Bonett, 1980; Wittenkind, Raeder & Grote, 2010). In the absolute

fitness and incremental fitness tests, all indices meet the standard, and have the best fit. Most of the parsimonious fitness indices meet the test standard, and have a good fit. Overall, in the entrepreneurship learning socialization and its influence model established in the study based on theories, both the model and the data have a good fit, and in the parameter estimation most of the estimated values are significant. This shows that all the indices of latent variables have their importance, and only the parameter value of entrepreneurship intention 'on 'entrepreneurship learning socialization' is low. Overall, the empirical data have a good explanatory power (Bentler & Bonett, 1980; Hair, Black, Babin & Anderson, 2010).

Students' entrepreneurship intention influences internship experience and labor market is an important factor which influences internship experience. Students' internship experience influences entrepreneurship learning socialization, entrepreneurial self-efficacy and entrepreneurial alertness are important factors which influence entrepreneurship learning socialization (Patel, Salahuddin & O'Brien, 2008; Wittenkind, Raeder & Grote, 2010) .

The results show that among all latent variables in the model, the direct influence of entrepreneurship intention on entrepreneurship learning socialization is not significant, indicating that the assumed influence of 'entrepreneurship intention on students' entrepreneurship learning socialization needs further testing; this is something worthy of a more in-depth study and validation in the future. Based on test results, although the overall result is acceptable, the model consistency level is not entirely satisfactory, and its entrepreneurship intention has a relatively low explanatory power for entrepreneurship learning socialization. The possible reasons are (Bentler & Bonett, 1980; Chang, 2010):

The measurement error variance of the three main variables in the model is too large. Although in the course of the investigation in this study each step was made following reasonable procedures, in a sample survey there are a survey bias and restrictions on the study objects in answering the questionnaire. These can result in a bias between the survey data and the actual situation (Wittenkind, Raeder & Grote, 2010).

The influence is test of indices and method. Currently in the verifying calculation of structural equations, the index value is subject to the sample size, and sometimes the index value may influence each other. When the index is far greater than or much lower than the standard value, the judgment is more accurate; when the index is close to the standard value, we then need to consider the possible influence from the error of the missing scope of variables. Although a complete research model was tried to be established in this study based on past researches and theories, there has been little domestic research on the topic of students' entrepreneurship learning socialization.

6. Implication

Good internship models, relevant entrepreneurship education and training, and government encourage the at tertiray education will yield high social returns. Instilling the urge for entrepreneruial learning will ensure that youths possess the relevant of internship skills and competencies that match the skill gaps and competencies in the entrepreneurial business and labor market. Governments need to create jobs and increase incentives for private enterprise and foster entrepreneurial culture.

7. Limited

There may be undetected factors which resulted in a low explanatory power, and there are other variables which have not been identified. Regarding this model's test results, perhaps in the future a further study can be conducted to find the variables either missing in the theories or can be further added or deleted, or more comprehensive empirical data can be collected for testing to improve the consistency between this model and empirical data.

8. Acknowledgement

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