# A STEP FOR EVALUATING CONSTRUCTIVIST APPROACH INTEGRATED ONLINE COURSES

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**ABSTRACT**
This research aims to reveal the validation of 86-items in order to develop a scale for evaluating constructivist approach integrated online courses in higher education practices. The main aim of this research process is to reveal a scale to further evaluate whether the online education practices in higher education have the notions of constructivist approach with constructed sub categories based on factor analysis. The Statistical Package for the Social Sciences (SPSS) was employed for the purpose of data entry, manipulation, and analysis. Firstly, the extended literature review and theory were considered to develop items about the online education practices. Then, the item pool was constructed in relation to the gap within the literature as it is a need to generate a scale for evaluating the online courses in higher education practices. Furthermore, items were selected from the pool and statistical analysis was done, then categories were set as constructivist online learning process, peer learning and evaluation, collaborative learning outcome, developing skills and online course design based on the supervision of two experts in the field. The scale will serve to evaluate online courses which practice constructivist approach within their design and system. Factor analysis of the items showed how this scale is acceptable, valid and reliable and how this research is significant to fill the gap in the literature as it can be repeated in further studies.
**Keywords:** Collaborative learning, constructivist approach, course design, online education, scale

## INTRODUCTION

Online education practices become the fundamental part of the higher education practices to diffuse knowledge and learning opportunities as an alternative service as regards the leaner centred education (Austin, et al, 2010; Gazi A, Silman, Birol, 2008). Learners are the central of the learning and teaching process in respect to leaner centred education which relies on needs, expectations and the satisfaction of the students (Zapalska, Brozik, 2006). Contemporary education system leads alternative and different learning and teaching platforms to satisfy the needs and expectations of the learners who enrolled higher education programs with demanding no limitation of the education as a time, space and distance. In this respect, online education practices gain reputation that provides differentiation of the service in higher education for quality and propose effective learning environment concerning life long learners who wish to continue education (Wallace, 2002).

Regarding the life long learning philosophy, especially the adult learners have enthusiasm to continue learning process to attribute their personal and professional development. In this respect, online education practices have a great role to facilitate being part of the higher education programs and develop advanced knowledge and professional knowledge at the same time through numerous facilities (Stacey, Smith, Barty, 2004).

Online education practices in higher education can be exhibited with its organisational and pedagogical aspects to reveal the quality of the programs that learners enrol. In this respect, concerning organisational learning and its impact to the pedagogical implications of the online education practices together is inevitable (McPherson, Nunes, 2006). Significantly, the pedagogical aspects such as course design, learning process, tutor facilitation, gaining subject matter knowledge and developing skills are the critical success factors of the online education practices which it is highly demanding to be investigated in detail (Gazi A, 2009; McLukie, Topping, 2004; Tu, Corry, 2003).

Regarding the notions of constructivist approach in online pedagogy, learning environment needs to be authentic and has connection to real world experiences. In addition, learning platform should foster social negotiation and mediation (Aksal A, 2009; Tu, Corry, 2003). Significantly, learners' prior knowledge has to be taken into account and content of the course should be convenient to the learners. Further to this, assessment should cover the process not only the product (Luxton-Reilly, 2009). Moreover, tutors should serve as a facilitator. In addition to this, course content and the facilitation of the tutor need to encourage learners to gain multiple perspectives based on social interaction (Aksal A, 2010; Aksal A, 2009; Jonassen, 1991).

As the online practices have potential to diffuse learner centred education and the constructivist approach within its pedagogy, there is intensified need to implement principles of constructivist approach into course design, learning process and reveal tutor and faculty contributions for that implementation in order to achieve the outcome of gaining subject matter knowledge and developing skills for the learners (Gazi A, 2010; Gazi A,

Aksal A, 2011). According to (Salmon, 2002), online course design as one of the critical success factor of online education is interactive and user-friendly to exhibit learning objectives, learning process and the outcome as learners expect to follow during the course. It needs to be plan and platform for shared recognition between groups (tutor, technical support, learners) who involved in social interaction in learning process (Mclukie, Topping, 2004). Further to this, constructivist based course design provides gaining socially constructed knowledge and developing particular skills such as team work, reflection and negotiation, etc (Austin, et al., 2010; Gazi A, 2009; Tu, Corry, 2003).

Moreover, constructivist based online learning process itself is another critical success factor as (Gazi A, Aksal A, 2011) highlighted in their researches. Arguments arise on constructivist online learning process as it fosters advanced knowledge and skills development through gaining multiple perspectives from others based on interaction and negotiation. In addition, various researches exhibited tutor and faculty contribution as imperative success factor of the online pedagogy. In this respect, researches pay attention that promoting collaborative, authentic learning environment needs effective competences of the tutors and support of the faculty with considering technical and organisational collaboration facilities (Jonassen, 1994; Macdonald, 2003).

Although researchers argued the organisational and pedagogical development of the online education practices as regards the constructivist approach, they stay partial by not being empirical and not signifying the evaluation tool for the effectiveness of the practices (Gazi A, 2010). In addition to this, various arguments arise on how courses need to be designed and how collaborative learning platform run into practice in respect to constructivist based online learning process. However, limited researches were conducted to evaluate the effectiveness of the practices and almost all researches considered to propose recommendations instead of revealing the satisfaction of the learners (Bernard, Rubalcava, 2000; Murphy, Cifuentes, 2001; Owens, Bozeman, 2009; Taylor, Hsueh, 2005).

In respect to dynamics of the critical success factors within the online pedagogy for implementing constructivist approach into online education practices and evaluating effectiveness of practices based on learner satisfaction, development and validation a scale is literature gap that needs to be fulfilled (Gazi A, Aksal A, 2011). Therefore, this research is significant as it reveals the development and validation a scale to further evaluate whether online courses have notions of constructivist approach and have impact of developing skills within collaborative learning environment.

## METHODOLOGY

The research encapsulates the development and validation a new scale that aims to provide a step for evaluating the notions of the constructivist approach in online courses and practices. This study focuses on the validity and reliability evaluation of 86 items relevant to constructivist online learning process, peer learning and evaluation, collaborative learning outcome, developing skills and online course design. The five main categories were revealed from the result of factor analysis as constructivist online learning process, peer learning and evaluation, collaborative learning outcome, developing skills and online course design (Cohen, Manion, Morrison, 2000).

### Participants

The research covered the online learners. In this respect, the scale was given to learners in the 2010-2011 Spring semester. The reason of choice this sample is that this online education practice approaches a constructivist educational philosophy.

The research study included 52 undergraduate students as research participants. Research participants were selected voluntarily from one of the higher education institutions in Turkey. 24(46, 2%) of the participants were female and 28(53, 8%) were male students. Further to this, Table I in below indicates gender and department of participants as demographic information in the research.

Table I. Gender and Department of the Research Participants

Profile of the participants

| | Frequency | Percent (%) |
|---|---|---|
| *Gender* | | |
| Female | 24 | 46.2 |
| Male | 28 | 53.8 |
| Total | 52 | 100 |
| *Age* | | |
| 17-20 | 37 | 71.2 |
| 21-24 | 13 | 25.0 |

| | | |
|---|---|---|
| 25-29 | 2 | 3.8 |
| Total | 52 | 100 |
| *Department* | | |
| *BOTE* | 52 | 100 |
| *Course* | | |
| EBT | 50 | 96.2 |
| other | 2 | 3.8 |
| Total | 52 | 100 |

Instrument

A questionnaire was conducted to volunteer participants that consisted of personal information form, ethical release form and the items. A personal information form provided to reveal the independent variables for this research such as gender, department. In addition to this, ethical release form provided a protocol between participants and researcher to keep the confidentiality and trustworthiness throughout the research process. 86-itemed questionnaire was implemented to expose the developed, valid and acceptable scale in relation to research focus.

In order to generate a scale with its validation, the five steps were followed. The first step encapsulates the extended literature review about the online education practices in higher education. Then, item pool was constructed in relation to literature. After that, draft of the scale was evaluated and reviewed by two experts for the content validity. Further to this, next step included the statistical analysis of the items. The last step is the division of the categories with the supervision of the experts in the field (Namlu, Odabasi, 2007).

Implementing constructivist approach into online education practices and evaluating the effectiveness of this implementation based on learner satisfaction is an imperative and hot issue within the literature. In this respect, various arguments arise on the role of constructivist based online learning process for the advanced knowledge and developing skills from different angles. However, literature stays partial by considering the conceptual framework and not proposing empirical results for the process effectiveness. Although the literature devotes detailed recommendations and gives a general idea on how to design constructivist based online learning environment, turning attention to evaluate this environment therefore developing a scale for that purpose is inevitable.

**RESULTS AND DISCUSSIONS**

The scale for constructivist approach integrated online education applications had been examined over 86 items. Before the analysis the scale, the calculation of the mean and the standard deviation of each items were done in the scale. 34 of the items were removed from the scale as a result of total correlation as under 0.20 meaning and test-retest correlation as insignificant on the level of .05. In this respect, analysis was done again by the remaining 52 items. As recommended by Chu & Murrmann (2006, p. 1183) after each omission "… alpha values were recomputed for the remaining items and the new corrected correlations were evaluated for further deletion of items.

In addition, the analysis of the score with the minimal score as 85 and the maximum possible score as 289 was found in the scale development. In fact, the expected range is 204 to present each experience from the lowest to highest the range. In this respect, examination of the scale showed that the lowest score was 85 and the highest was 289 and the range was 204 as the scale covered a large part of the expected range.

Further to this, the mean of the scores of this was 192, the median was 194, the Standard deviation was 44, 29. In addition, Skewnes value as it was calculated for distribution was -0.319 and Kurtosis value was 0.72. Therefore, the distribution was sufficient and normal (See Appendix I for Table 2).

For the scale development process, principal component analysis was done by 52 items. Within this framework, Kaiser-Meyer-Olkin (KMO) value was 0.697 in the analysis. KMO tests were also done to determine whether the partial correlations were under limit and the distribution is sufficient or not for factor analysis. The statistical evidences underlined that KMO value need to be over 0.60, and it could be accepted as sufficient if it is close to 0.90 (Nunnally, 1970). In this respect, KMO value for this research is acceptable and sufficient (See Appendix II for Table 3).

The scale development process covered Barletts' test of sphericity (BTS). This test is significant to test correlation matrix=unit matrix of the hypothesis. Correlation between the variables is different from 1 and the factor analysis is appropriate for the variables as the rejection of the hypothesis is the significant evidence for that result. Furthermore, $v^2$ value for BTS was 1112.208 ($p < 0.0001$) for this study.

Nunally and Bernstein (1994) suggested factor loading of .40 as cutoff value for new scale development studies. According to that point, this research considered 0.40 as the limit. This limit resulted with 10 factors with eigenvalue of over 1. In this respect, as eigenvalue is over 1 for factors was 71.89% for the percentage of variance analysis. Total Variance can be found in Table 4 (See Appendix III). 5 factors were determined since 10 factors represented a large number of sub dimensions.

The cumulative explanation percentage for the 5 factors is 51.682% that can be also presented in Table 4. Total and loading percentage of variance results from the analysis are as the first factor 10,585 and 31.133%, as the second factor 3.561 and 10.474%, as third factor 2.273 and 6.684%, as fourth factor 2.114 and 6.218%, as fifth factor 1.543 and 4.556%. Further to this, variance between 40% and 60% is appropriate for this field. In the variance percentage as it was found over 50% for this research, it is in the acceptable range.

Churchill (1979) and Parasuraman et al. (1986) suggested that the purification of an instrument begins with the computation of Cronbach's alpha coefficient, item-to-total correlation and exploratory factor analysis (EFA). According to varimax rotation, the percentage of variances stated by 5 factors as 14,533% for the first factor, 13.979% for the second factor, 11.623% for the third factor, 10,059% for the fourth factor and 8,550% for the fifth factor with the factor loads that were between 0.50 and 0.78. In this respect, Table 5 (See Appendix IV) included the results of varimax rotation. The examinations showed how the items are in the expected and sufficient parameters. Therefore, the mean of the remaining items were in between 2.69 and 2.09 and the standard deviations were in between .91 and 1.16. As Item total correlations need to be between 0.55 and 0.72, this shows how the correlation is over 0.20 is in the acceptable level. Furthermore, Total cronbach alfa was 0.92. The scale reflected five titles according to the results of the factor analysis. Considering the related literature and the factor analysis of the new scale development, these titles are constructivist online learning process, peer learning and evaluation, collaborative learning outcome, developing skills and online course design. As this research is a step and it opens an academic debate for developing a new scale, applications were limited which it can be repeated for further studies.

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## APPENDICES

### APPENDIX I

**Table 2**

Normal distribution analyses

| Statistics | | |
|---|---|---|
| N | | |
| | Valid | 52 |
| | Missing | 0 |
| Mean | | 192.0000 |
| Standard error of mean | | 6.14266 |
| Median | | 194.0000 |
| Mode | | 173.00 |
| Standard deviation | | 44.29535 |
| Variance | | 1962.078 |
| Skewness | | -0.319 |
| Standard error of skewness | | 0.330 |
| Kurtosis | | 0.072 |
| Standard error of kurtosis | | 0.650 |
| Range | | 204.00 |
| Minimum | | 85.00 |
| Maximum | | 289.00 |
| Sum | | 9984.00 |

a Multiple modes exist. The smallest value is shown.

### APPENDIX II

**Table 3**
**KMO and Bartlett_s test**

| Kaiser–Meyer–Olkin Measure of sampling Adequacy | | |
|---|---|---|
| 0.670 | | |
| Bartlett's test of Sphericity | Approximate v2 | 1112.208 |
| | df | 561 |
| | Sig. | 000 |

**APPENDIX III**

**Table 4**

The results of factor analysis total variance explained

| Component | Initial Eigenvalues | | | Extraction sums of squared loadings | | | Rotation sums of loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative% | Total | %of Variance | Cumulative |
| 1 | 10.585 | 31.131 | 31.131 | 10.585 | 31.133 | 31.133 | 4.948 | 14.553 | 4.553 |
| 2 | 3.561 | 10.474 | 41.607 | 3.561 | 10.474 | 41.607 | 4.753 | 13.979 | 8.532 |
| 3 | 2.273 | 6.684 | 48.291 | 2.273 | 6.684 | 48.291 | 3.952 | 11.623 | 0.155 |
| 4 | 2.114 | 6.218 | 54.508 | 2.114 | 6.218 | 54.508 | 3.420 | 10.059 | 0.214 |
| 5 | 1.549 | 4.556 | 59.064 | 1.549 | 4.556 | 59.064 | 3.009 | 8.850 | 9.064 |
| 6 | 1.324 | 3.894 | 62.959 | | | | | | |
| 7 | 1.272 | 3.742 | 66.701 | | | | | | |
| 8 | 1.171 | 3.446 | 70.146 | | | | | | |
| 9 | 1.040 | 3.060 | 73.206 | | | | | | |
| 10 | 1.023 | 3.008 | 76.215 | | | | | | |
| 11 | 0.840 | 2.470 | 78.685 | | | | | | |
| 12 | 0.823 | 2.421 | 81.106 | | | | | | |
| 13 | 0.659 | 1.938 | 83.044 | | | | | | |
| 14 | 0.638 | 1.877 | 84.921 | | | | | | |
| 15 | 0.612 | 1.800 | 86.721 | | | | | | |
| 16 | 0.559 | 1.644 | 88.365 | | | | | | |
| 17 | 0.515 | 1.514 | 89.879 | | | | | | |
| 18 | 0.479 | 1.410 | 91.289 | | | | | | |
| 19 | 0.439 | 1.272 | 92.561 | | | | | | |
| 20 | 0.381 | 1.120 | 93.682 | | | | | | |
| 21 | 0.359 | 1.056 | 94.737 | | | | | | |
| 22 | 0.311 | 0.916 | 95.653 | | | | | | |
| 23 | 0.239 | 0.704 | 96.358 | | | | | | |
| 24 | 0.213 | 0.626 | 96.983 | | | | | | |
| 25 | 0.173 | 0.510 | 97.493 | | | | | | |
| 26 | 0.170 | 0.501 | 97.995 | | | | | | |
| 27 | 0.144 | 0.422 | 98.417 | | | | | | |
| 28 | 0.139 | 0.410 | 98.827 | | | | | | |
| 29 | 0.107 | 0.315 | 99.142 | | | | | | |
| 30 | 0.095 | 0.280 | 99.422 | | | | | | |
| 31 | 0.071 | 0.208 | 99.630 | | | | | | |
| 32 | 0.060 | 0.175 | 99.805 | | | | | | |
| 33 | 0.039 | 0.116 | 99.921 | | | | | | |
| 34 | 0.027 | 0.079 | 100.000 | | | | | | |

Extraction method: principal component analysis.

**APPENDIX IV**

**Table 5**
Scale mean, standard deviation, item total, factor analysis and factor loading

| Items and factors | Mean | SD | Item total | Varimax Factor load |
|---|---|---|---|---|
| *Constructivist online learning process α=0.885* | | | | |
| PD 9. Construction of knowledge requires engagement to collaborative solutions on problems. | 2.4231 | 1.05433 | 0.668 | 0.774 |
| PD 11. Active creation of knowledge is based on collaborative learning environment. | 2.5769 | 0.97711 | 0.660 | 0.739 |
| PD 5. Construction of knowledge is based on team work. | 2.4233 | 1.07277 | 0.661 | 0.675 |
| PC 7. Tutor considers motivation of the learners during the course. | 2.5577 | 0.99830 | 0.550 | 0.660 |
| PD 15. Knowledge and understanding are demonstrated through sharing relevant information. | 2.2885 | 1.16040 | 0.686 | 0.648 |
| PB15. This learning experience provides problem solving. | 2.5000 | 1.03848 | 0.656 | 0.642 |
| PA23. Learning activities supports to get. | 2.3077 | 0.96077 | 0.631 | 0.622 |
| PB9. Learning is an active, social process. | 2.4231 | 1.10872 | 0.579 | 0.606 |
| PC9. Tutor keeps records of learning progress of the learners. | 2.5962 | 1.17590 | 0.630 | 0.592 |
| *Peer learning and evaluation: α=0.873* | | | | |
| PA32. Learners construct their own knowledge actively by eliciting specific communicative activities. | 2.5000 | 1.14618 | 0.667 | 0.743 |
| PA49. Learners are flexible. | 2.5000 | 1.16316 | 0.641 | 0.696 |
| PA31. Positive and social climate is necessary in developing and sustaining collaborative learning in this course. | 2.3462 | 1.10053 | 0.614 | 0.681 |
| PA28. Learner has positive attitude and confidence to be enrolled to this course. | 2.4615 | 1.09296 | 0.728 | 0.676 |
| PA22. This course guides gaining power of own responsibility on learning. | 2.6923 | 1.09434 | 0.662 | 0.661 |
| PA27. Posted messages, involved activities, survey can be the evidence to understand how this course improves learning and skills. | 2.2885 | 1.10855 | 0.664 | 0.661 |
| PA52. Skills such as critical thinking, communication and teamwork are the basic skills that are evaluated. | 2.4808 | 1.16300 | 0.584 | 0.660 |
| PB7. Learning process requires self evaluation and control. | 2.3269 | 1.1327 | 0.486 | 0.563 |
| *Collaborative learning outcome: α=0.837* | | | | |
| PC10. Communication tools and technological facilities need to be under control. | 2.0962 | 0.97538 | 0.553 | 0.760 |
| PE19. Learner has intellectual flexibility. | 2.3654 | 1.08517 | 0.700 | 0.615 |
| PE25. Learner has communication, problem solving, team building, reflective thinking abilities. | 2.3269 | 0.98461 | 0.675 | 0.573 |
| PE18. Learner has ability of higher order thinking. | 2.4615 | 1.09296 | 0.673 | 0.572 |
| PB24. Learners are satisfied with online collaborative learning process. | 2.2115 | 0.91473 | 0.595 | 0.531 |
| PB22. Task based learning creates environment for shared cognition. | 2.2308 | 0.96234 | 0.603 | 0.770 |
| *Developing skills: α=0.794* | | | | |
| PE6. Learner has ability to think critical. | 2.5385 | 1.03775 | 0.694 | 0.778 |
| PE5. Content and developing skills are relevant to the learners. | 2.4615 | 1.01868 | 0.638 | 0.702 |
| PE7. Learner has ability to make judgment. | 2.4615 | 1.19577 | 0.643 | 0.698 |
| PE15. Learner is decision maker on learning process. | 2.3654 | 0.81719 | 0.471 | 0.617 |
| *Online Course Design: α=0.754* | | | | |
| PA 16. Course contents provide for and encourage multiple perspectives. | 2.3846 | 1.06925 | 0.594 | 0.745 |
| PB1. Learning is constructed through interactions with others. | 2.3654 | 0.86385 | 0.635 | 0.696 |
| PA39. Skills are domain specific and knowledge rich. | 2.2115 | 0.91473 | 0.394 | 0.586 |
| PA41. This course provides potential learning through development of group work, presentation and peer evaluation. | 2.2692 | 1.10463 | 0.495 | 0.543 |
| PA47. Attitude and motivation affect learner performance. | 2.1538 | 0.89409 | 0.513 | 0.534 |