International Journal of Research Studies in Education
2014 January, Volume 3 Number 1, 49-62

The effects of learning environment on graduates' competencies

Patria, Bhina ✉
Faculty of Psychology, Universitas Gadjah Mada, Indonesia (patria@ugm.ac.id)
International Centre for Higher Education Research Kassel (INCHER-Kassel), University of Kassel, Germany

ISSN: 2243-7703
Online ISSN: 2243-7711

Received: 12 October 2013 **Revised**: 30 October 2013 **Accepted**: 31 October 2013
Available Online: 10 November 2013 **DOI**: 10.5861/ijrse.2013.572

OPEN ACCESS

Abstract

The aim of this study is to investigate the model of the effects of learning environment on graduates' competencies. The analysis was based on the responses to a questionnaire of 2,988 graduates from Gadjah Mada University, Indonesia. The model was analyzed using structural equation modelling. The tested model indicated a good fit model with χ^2 (199, N = 2988) = 1773.17, p = .000, RMSEA = .051, CFI = .98. The results suggest a significant positive influence of learning environment on graduates' competencies.

Keywords: learning environment; graduates' competencies; graduate survey; structural equation modelling; student-centred learning

The effects of learning environment on graduates' competencies

1. Introduction

As a consequence of massification of higher education, more high school leavers are acquiring higher education. This massification shifted the responsibility for financing higher education from the government to individual students and their families (Altbach, Reisberg, & Rumbley, 2009). This phenomena pressures higher education to provide accountable data on the quality of teaching and learning (Altbach et al., 2009; Nusche, 2008). Society (i.e. prospective students, parents, employers, tax payers, and policy makers) demands comparable information on students' learning outcomes.

Another consequence of the massification of higher education is that society demands that higher education put more emphasis on the professional relevance of the study programs and employability while at the same time not neglecting the benefit of academic learning beyond the labour market (Teichler, 2008).

These concerns, of course, demand more intense research on the relation between higher education and work. However, the available research seems to be insufficient (Brennan, Kogan, & Teichler, 1996; Teichler, 1999, 2007). By reflecting on these contexts, this study is designed to add to the discussion on the relationship between higher education and the world of work, especially in the domain of learning environment. The present study seeks to address one question: Does learning environment influence graduates' competencies?

Studies in education often mention Biggs' (1989) model of learning. Biggs' model comprises three main components: the learning environment and student characteristics (presage), students' approach to learning process (process), and learning outcomes (product). This model is called the "3P" model. The *presage* factor or the prior learning condition is comprised of two components: students' characteristics and teaching context. Students characteristics relates to students' individual differences such as prior knowledge, abilities, motivation and conception of learning. The teaching context is all factors under the teacher's or institution's control (i.e. curriculum, method of teaching, assessment, and learning climate).

The presage factor influences students in approaching a particular task (*process*) and eventually influences the learning outcome (*product*). The learning outcome could be quantitative (how much was learned), qualitative (how well it was learned), institutional (what grades or accreditation it was accorded) or affective (how students feel about their learning).

The educational productivity model proposes a similar concept as the 3P model; it asserts three general sources that influence students' learning outcomes: the characteristics of the student; the characteristics of the learning environment; and contextual influences of a social nature.

Studies have revealed the effects of learning environment on students' or graduates' educational outcome. A study on students' perception of learning environment and academic outcomes found that learning environment was a stronger predictor of learning outcomes than prior achievement at school (Lizzio, Wilson, & Simons, 2002). Lizzio and colleagues (2002) also pointed out that positive perceptions of teaching environment not only influence academic achievement but also qualitative learning outcomes. Learning environment is characterized by good teaching and independence improved students' generic academic and workplace skills (Lizzio et al., 2002).

A study investigating the effect of active learning environment on graduates' competencies showed a similar result (Vaatstra & De Vries, 2007). The study reported that graduates from active learning environments reported to have higher generic and reflective competencies than graduates from conventional learning environment. Furthermore, the results indicated that course content and curriculum design were affecting graduates' generic and reflective competencies (Vaatstra & De Vries, 2007).

A more recent study investigated the effect of learning environment on graduates' transition period from higher education to employment; Patria (2013) pointed out that learning environment affects graduates' competencies. Vermeulen and Schmidt (2008) reported that learning environment increases students' motivation, learning outcomes, and in turn affects graduates' career success.

The objective of the present study is to test a model on how learning environment affects learning outcomes in term of graduates' competencies. This approach is by no means a new concept; prior studies (e.g. Lizzio et al., 2002; Patria, 2013; Vermeulen & Schmidt, 2008) have tested such a relationship. However, the previous studies' models are mostly based on an item parcelling method instead of using latent variables, which are considered to be more appropriate in measuring the complex relationship. More about this topic will be addressed in the method section.

2. Method

2.1 Subject

In 2012 Gadjah Mada University (UGM) conducted a survey to collect data from graduates. The data used in this study was based on the data collected in the graduate survey. The survey was conducted mainly for the purpose of university development and curriculum evaluation. Other purposes include: to investigate the relation between curriculum and labour market need, and the accreditation process. The survey addressed several themes such as: socio-biographic background, study conditions, transition to employment, current employment condition and links between study and employment. The questionnaire was written in Indonesian (Bahasa Indonesia) and for the purpose of this study the related questions and answers have been translated to English with the help of professional translator.

The data set consisted of 2988 respondents graduated with bachelor degree. The gender representation was roughly equal, with slightly more male (58.3%) than female (41.7%) graduates. The graduates' average age was 29 years old (*SD* = 8.12, *Mdn* = 27). On average, graduates were surveyed 6.5 years after graduation (*SD* = 7.55, *Mdn* = 4). All fields of studies were included in the data set. This was to ensure that the variance of different fields of study and different type of institutions were well represented. Table 1 depicts the composition of graduates' field of study.

Table 1

Gender by Field of study (percent)

	Field of study						
	Agriculture	Engineering	Humanity	Natural science	Social science	Health	Total
Male	58	71	49	60	50	38	58
Female	42	29	51	40	50	62	42
Total	100	100	100	100	100	100	100
Count	637	846	368	491	401	245	2988

Note. (1) Agriculture consisted of the following faculty: Forestry, Animal science, Veterinary, Agriculture, and Agricultural technology. (2) Engineering: Architecture and planning engineering, Information technology & electrical engineering, Physics engineering, Geodetic engineering, Geological engineering, Chemical engineering, Mechanical and industrial engineering, and Civil and environmental engineering. (3) Humanity: Philosophy and Cultural science. (4) Natural science: Biology, Geography, and Mathematics and Natural science. (5) Social science: Economics and business, Law, Social political science, and Psychology. (6) Health: Pharmacy, Medicine, and Dentistry.

2.2 Variables and instruments

2.2.1. Learning environment

In the graduate survey questionnaire, one question measured the quality of the learning environment as perceived by the graduates. The graduates were asked to rate their responses to nine statements related to how well the study program organized the study activity. The scale ranges from 1 "Strongly disagree" to 7 "Strongly agree".

Table 2 presents the variables of learning environment with the mean scores and standard deviations listed. Reliability analysis showed that the learning environment questions are internally consistent with Cronbach's Alpha = .932. To provide the evidence of construct validity, the learning environment measurement model was tested using structural equation modelling. Besides providing evidence of construct validity, testing the measurement model prior to the structural model is recommended to improve the fitness of the structural model (Hair, Black, Babin, & Anderson, 2010).

When the learning environment model was fitted to the data, the following fit indices resulted: χ^2 (27, N = 2988) = 2065.05, p = .000, RMSEA = .159, CFI = .895. This result was below the requirement of a good model fit by Hair and colleagues (2010). For a model with less than 12 observed variables and N more than 250 Hair et al. suggested: CFI ≥ .97 and RMSEA < .07.

To improve the fit statistics, the model was re-specified based on the result of modification indices. Freeing a fixed or constrained parameter with the largest modification indices will improve the model fit, as long as the parameter can be interpreted substantively (Brown, 2006; Hair et al., 2010). The result of modification indices suggested that the model can be improved by setting covariance paths between few measurement errors (i.e. er30b - er30c, er30e - er30f, er30h - er30i). After the re-specification, the fit statistics for learning environment measurement model were improved with χ^2 (24, N = 2988) = 410.62, p = .000, RMSEA = .07 and CFI = .98. This result met the requirement of a good model fit by Hair and colleagues (2010). Figure 1 depicts the learning environment measurement model.

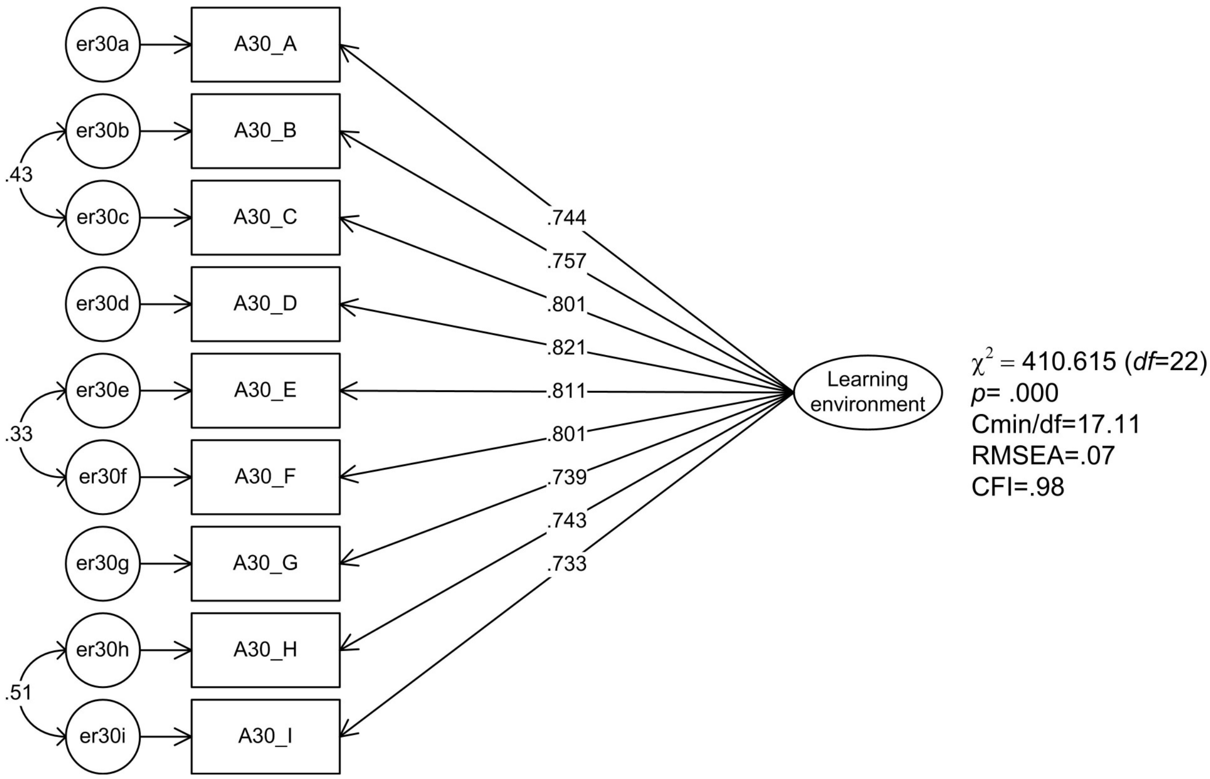

Figure 1. Learning environment measurement model

Table 2

Items measuring learning environment

Variable name	Variable	Mean	SD
A30_A	The academic activity plan was well developed	5.03	1.42
A30_B	The academic activities stimulated students' thoughts	4.68	1.49
A30_C	In academic activities, students' initiatives were appreciated	4.89	1.44
A30_D	The learning process employed methods that encouraged life-long learning	4.67	1.53
A30_E	The study program facilitates students' research interest	4.77	1.60
A30_F	The study program facilitated research activities with sufficient equipment.	4.62	1.65
A30_G	The academic staffs were available for discussion about the course contents.	4.78	1.59
A30_H	The study program facilitates students to establish contact with alumni	4.37	1.78
A30_I	The study program facilitated students to acquire work experience	4.29	1.87

Measurement model validity depends on establishing acceptable levels of goodness-of-fit of the measurement model and finding specific evidence of construct validity (Hair et al., 2010). Convergent validity is one key component in establishing construct validity. To assure convergent validity, factor loading should be ideally .7 or higher and construct reliability of should be .7 or higher (Hair et al., 2010).

As can be seen in Figure 1 all factor loading in learning environment are all above .7. The construct reliability of learning environment is .95. This provided the evidence of convergent validity of learning environment measurement model used in this study.

2.2.2. Graduates' competencies

Question 47 of the UGM's questionnaire was used as the indicator of graduates' competencies. Graduates were asked to rate their competencies which are needed by employers on a scale ranging from 1 "Not at all" to 7 "To a very high extent". There were 16 items of competencies that graduates rated according to their perception. Reliability analysis showed that the items measuring graduates' competencies are internally consistent with Cronbach's Alpha = .964.

To provide the evidence of construct validity the competencies model was tested using structural equation modeling. When the model was fitted to the data, the following fit indices resulted: χ^2 (104, N = 2988) = 6065.28, p = .000, RMSEA = .139, CFI = .880. This result was below the requirement of a good model fit by Hair and colleagues' (2010) (CFI $\geq$ .97 and RMSEA < .07).

For further improvement of the fit statistics, the model was re-specified base on the result of modification indices. The result of modification indices suggested setting covariance paths between er30c-er30d, er30k-er30l, er30n-er30o, er30o-er30p, and er30h-er30n.

The fit statistics for competencies measurement model improved with χ^2 (59, N = 2988) = 1079.36, p = .000, RMSEA = .07 and CFI = .98. This result met the requirement of a good model fit by Hair and colleagues (2010). The final measurement model for graduates' competencies can be seen in Figure 2. The final items can be seen in Table 3.

The evidence of convergent validity of the graduates' competencies measurement model was shown by the factor loadings which are all above .7 (see Figure 2). The construct reliability also showed an adequate value (.98).

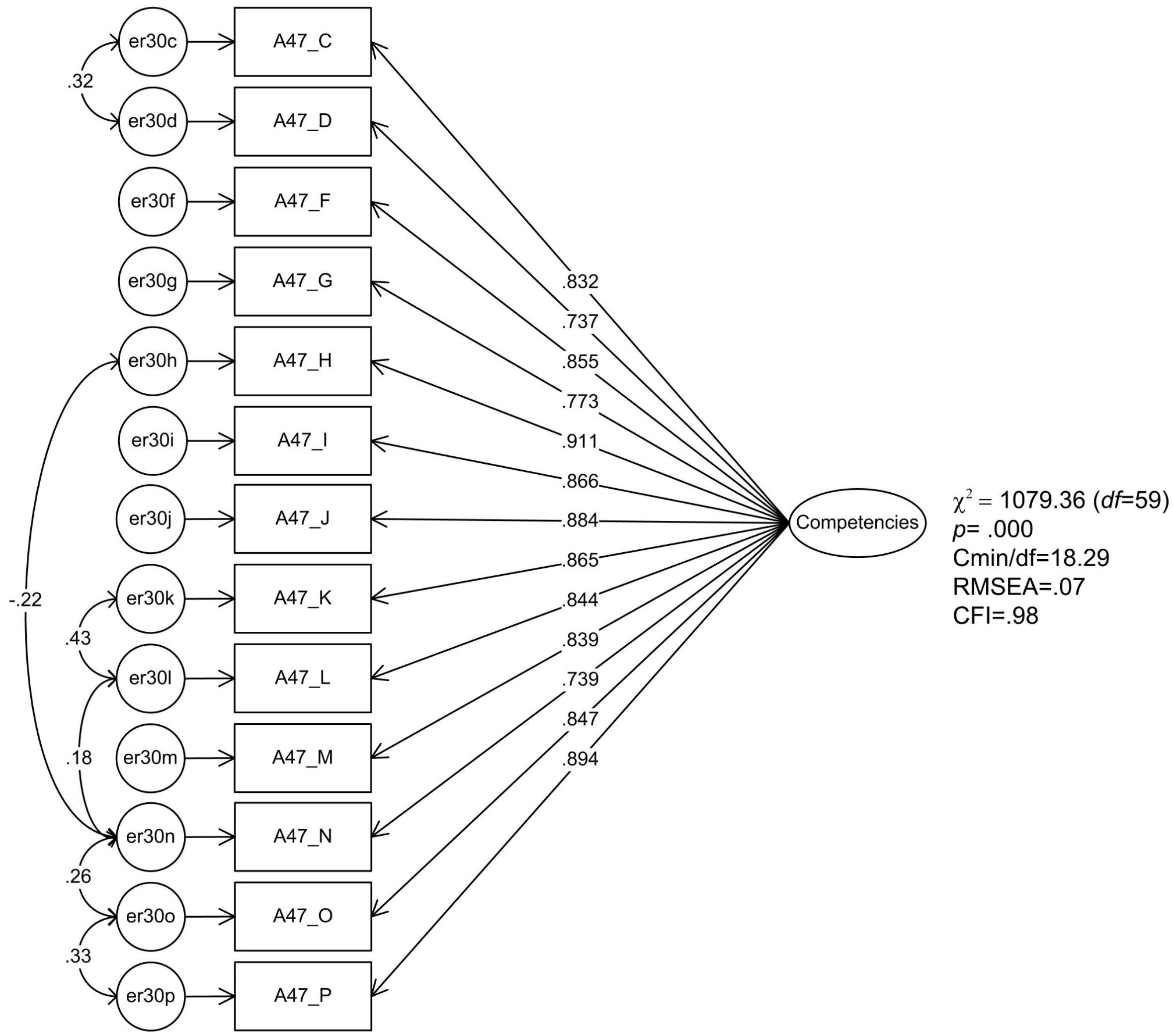

Figure 2. Graduates' competencies measurement model

Table 3

Items measuring graduates' competencies

Variable name	Variable	Mean	SD
A47_C	Oral communication skills	6.15	1.17
A47_D	Written communication skills	5.86	1.24
A47_F	Foreign language proficiency	6.17	1.17
A47_G	Working in a team/teamwork	5.94	1.24
A47_H	Ability to implement new technology / computer	6.24	1.14
A47_I	Problem-solving ability	6.05	1.20
A47_J	Leadership	6.13	1.20
A47_K	Creativity	6.19	1.18
A47_L	Discipline	6.22	1.16
A47_M	Work commitment	6.07	1.22
A47_N	Critical thinking	5.93	1.29
A47_O	Loyalty	6.12	1.17
A47_P	Emotional intelligence	6.25	1.12

2.3 Data Analysis

For testing the model, this study used structural-equation modelling (SEM), also known as analysis of covariance structures, or causal modelling. Unlike multiple-regression-based approaches to estimate structural paths, SEM techniques offer the potential to remove measurement error from estimates of structural relationships (Hall, Snell, & Foust, 1999). The advantage of using SEM is that it can examine a series of dependence relationship simultaneously and the ability to represent unobserved concepts (latent variables) in the relationship (Hair et al., 2010).

Amos™ (Analysis of moment structures) was the software used to test the model. Amos provides a clear representation of the model in graphical mode and the numeric methods implemented in Amos are among the most effective and reliable available (Arbuckle, 1999).

Amos has several outputs that can be used as criteria for fitting a model. Outputs used in this study were: Chi-square statistic, Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA). CFI and RMSEA were used in addition because Chi-square tends to be significant in a model with a big data set.

SEM's statistical goal is to test a set of relationships representing multiple equations. It needs a measure of fit or predictive accuracy that reflects the overall model, not a single relationship (Brown, 2006). Therefore, measure of fit for a single relationship (e.g. R^2 for multiple regression) is not suitable for SEM (Hair et al., 2010). Hair et al. (2010) further stated that the fit measure of a model depends on establishing acceptable levels of goodness-of-fit (GOF).

This study used the threshold of fit indices by Hair et al.(2010). Hair et al.(2010) proposed a more refined threshold for assessing a structural model. The threshold criteria included the number of observations and the number of observed variable in deciding the cut-off values of the model fit. For models with 12-30 observed variable and cases (N) more than 250, the suggested threshold values are: RMSEA $< .07$ and CFI $\geq .92$ (Hair et al., 2010). Beside the whole data set, the model was also tested on control groups which were gender and field of study.

As mentioned in the introduction, the statistical analysis conducted in this study is not based on item-parcelling method as used in prior studies in learning environment (Lizzio et al., 2002; Patria, 2013; Vermeulen & Schmidt, 2008). This study incorporated latent variables in the structural analysis which is considered a better approach than item parcelling.

In multivariate analysis there is a need to materialize latent variables. One of the common methods is to use item parcelling to produce a variable which is used as the representative of the latent variable in further analysis. Item parcelling, which belongs to the coarse factor score category, is calculated by averaging or summing the indicators' raw score. Other variations of this method including: applying a cut-off value, using standardized variables and using weighted sum scores (DiStefano, Zhu, & Mindrila, 2009). The item parcelling method is widely used because it is simple and easily administered in statistical programs. Nevertheless, researchers argue that this method may poorly represent the latent factor, for example the factor score may be intercorrelated even when it is previously assumed to be uncorrelated (e.g. Glass & Maguire, 1966). Another concern is regarding the equal weight of each item, regardless of the difference of loading value. This means that items with low loading value are treated equally with higher loading in the factor score (DiStefano et al., 2009).

3. Result

The model of the effects of learning environment on graduates' competencies was tested with Structural Equation Modelling using Amos program version 18. The results of the tested model were χ^2 (199, N = 2988) = 1773.17, p = .000, RMSEA = .051, CFI = .98. This result indicates a good fit based on the criteria by Hair et al. (2010). The squared multiple correlations yielded .08 which means that 8% of the variance in graduates' competencies was explained by learning environment. The diagram of the model can be seen in Figure 3.

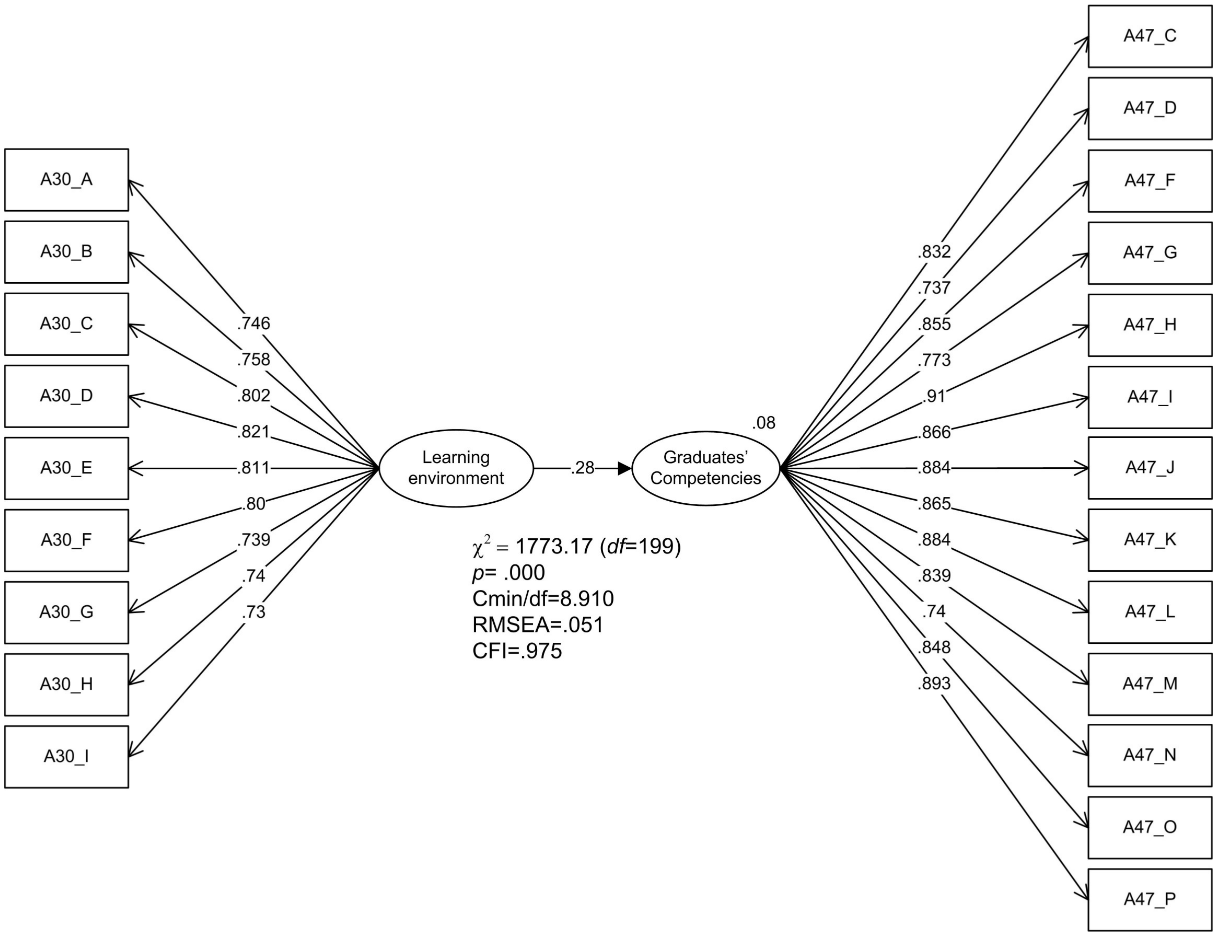

Figure 3. Structural model of the effect of learning environment on graduates' competencies

To see the effects of gender and field of study, the analysis was conducted with controlling for graduates' gender and field of study. Studies showed that field of study and genders are relevant issues that affect graduates' learning outcomes and future life (e.g. Allen & Van Der Velden, 2007; Dolton & Makepeace, 1990; Ng, Eby, Sorensen, & Feldman, 2005; Rumberger & Thomas, 1993). Table 4 depicts the fit statistics of the model controlled by gender and field of study. Table 5 shows the regression weight coefficient of the effect of learning environment on graduates' competencies controlled by gender and field.

Table 4

Fit statistics of the model by gender and field of study

	N	χ^2	*df*	RMSEA	CFI
Gender					
Male	1741	1196.92*	199	.054	.972
Female	1247	922.89*	199	.054	.973
Field of study					
Agriculture	637	784.18*	199	.068	.953
Engineering	846	746.79*	199	.057	.967
Humanity	368	571.92*	199	.071	.957
Natural science	491	501.72*	199	.056	.973
Social science	401	570.40*	199	.068	.954
Health	245	547.75*	199	.085	.947

Note. * $p < 0.01$

As can be seen in Table 4, the fit indices vary between field of study and gender. However, the fitness parameter in most models is sufficient for a fit model. One exception is in the field of health, the RMSEA (.085) is insufficient for a fit model. Most regression weights also showed a significant effect of learning environment on graduates' competencies except in the field of health (β = .64, p = ns) (Table 5).

Table 5

Regression weight coefficients of the model by gender and field of study

	β	p
Gender		
Male	.182	.000
Female	.264	.000
Field of study		
Agriculture	.265	.000
Engineering	.256	.000
Humanity	.286	.000
Natural science	.134	.000
Social science	.151	.000
Health	.064*	.102

Note. * p = ns

4. Discussion

This study investigated the effect of learning environment on graduates' competencies. The analysis, based on a structural model, has shown that learning environment significantly affects graduates' competencies. This result is in accordance with prior studies (e.g. Lizzio et al., 2002; Patria, 2013; Vermeulen & Schmidt, 2008). However, instead of using proxy measures of learning environment and study outcome like the previous studies, the present study used latent variables in the analysis. This approach provided a better measurement of the learning environment and graduates' competencies. Thus this study has important findings to contribute to previous discussion on the relationship between learning environment and study outcomes.

The effect of learning environment on graduates' competencies generally showed a stable result across gender and different field of studies. However, the inconsistency of the result was found in the field of health. Even though in the field of health the model showed fit statistics, the regression weight coefficient from learning environment to graduates competencies showed non-significant relation (Table 5). This seems in accordance with the explanation of Norman and Schmidt (2000) that students in medical education are atypical in the term that they have survived the rigour of highly selective admission process. Therefore, they can excel in their studies regardless the study condition they are in (Norman & Schmidt, 2000).

The following sections discuss the effects of learning environment on graduates' competencies based on the aggregation of learning environment factors. Patria (2013) asserted that learning environment consists of five components: structure of courses, institutional support, infrastructure, student activity, and research. Unfortunately not all components were covered in this study because of the unavailability of the data in UGM's graduate survey. In this study *structure of courses and institutional support* factor was represented by item: A30_A (The academic activity plan was well developed), A30_B (The academic activities stimulate students' thoughts), A30_C (In academic activities, students' initiatives were appreciated), and A30_D (The learning process employed methods that encouraged life-long learning). *Research* factor was represented by item: A30_E (The study program facilitates students' research interest) and A30_F (The study program facilitated research activities with sufficient equipment). *Student activity* factor was represented by item: A30_G (The academic staff were available for discussion about the course contents), A30_H (The study program facilitates students to establish contact with alumni), and A30_I (The study program facilitated students to acquire work experience).

4.1 Structure of courses, institutional support and graduates' competencies.

Based on these results, it is advisable that higher education institutions should encourage academic activities that stimulate and appreciate students' learning processes. The learning process should also encourage students' life-long learning. These indicators matched with the characteristics of active learning and a student-centred learning (SCL) approach. SCL is a learning process with the following principles: (a) the learner has full responsibility for her/his learning, (b) involvement and participation are necessary for learning, (c) the relationship between learners is more equal, promoting growth and development, (d) the teacher becomes a facilitator and resource person, (e) the learner experiences confluence in his education (affective and cognitive domains flow together), and (f) the learner sees himself differently as a result of the learning experience (Brandes & Ginnis, 1986).

In defining SCL, Cannon, and Newble (2000) asserted that the main component of SCL is student responsibility and activity instead of strong emphasis on teacher control and coverage of academic content in conventional approach.

SCL is usually contrasted with conventional method of teacher-centred learning (TCL). In a TCL environment, the teacher is regarded as the only source of knowledge. The teacher transfers the knowledge to the student by lecturing in the classroom while the student is in a passive and receptive role.

In their future career students are expected to achieve critical thinking and other higher cognitive outcomes, therefore they have to have the opportunity to practice application, think critically and receive feedback on the results (Boyapati, 2000). In a student centred approach this is covered in activities such as group discussions.

The discussion activities in SCL also enhance students' interaction with others. This interaction is called lateral interaction (Biggs, 1989). Lateral interaction stimulates peer teaching which in turn encourage students to reflect on what they know and share it to their friends. Moreover, peer teaching also encourage students to practice their communication and social skills (Biggs, 1989). Therefore, SCL develops skills in group membership and leadership (Boyapati, 2000). There is also evidence that SCL activities promote the development of higher-order skills such as critical thinking and problem solving (Brush & Saye, 2000).

Finlay and Faulkner (2005) asserted that peer learning encourages students to fulfil the targeted learning outcomes, encourage critical and active learning, encourage wider reading, and produce transferable skills.

4.2 Research and graduates' competencies

The result of the analysis suggests that universities should support students' research because it relates to the improvement of competencies. Involvement in research is a good opportunity for the students to develop competencies such as: critical thinking, communication skills, working in a team and problem solving skills. Mullen (2000) stated that through active involvement in research, graduate students can go further in their traditional research condition to take risks, to work as a team and to include artistry in their work.

There is a concern that academic research tends to have negative effects on students' learning. This concern is restricted to the effect of lecturer research on student learning and not the involvement of students in research. The concern is based on the logic that research activities divert lecturer attention away from teaching duties. Ramsden and Moses (as cited in Lindsay, Breen, & Jenkins, 2002), based on their quantitative research on the relationship between undergraduate teaching and academic research, concluded that there is a negative relationship between extent of involvement in research and ratings of teaching quality.

However, studies also showed that research involvement facilitates student-centred learning by increasing flexibility in determining course content (Jenson as cited in Breen & Lindsay, 1999). Other research suggested that the effects of research on students’ learning also depend on the characteristics of the students. Breen and Lindsay (1999) asserted that students with intrinsic motivation and specific form of course competence are associated with positive attitudes towards research activity, while students with extrinsic motivation who are social and achievement oriented have negative attitudes towards research.

A qualitative study by Lindsay et al. (2002) asserted that even though students (undergraduate and postgraduate) are aware of the disadvantages of lecturers research activities (i.e. reduced availability, competition with teaching, and curriculum distortion), they associate more benefits than disadvantages with lecturer research.

4.3 Student activity and graduates' competencies

The result of this study suggested that higher education institutions should encourage the availability of the teaching staffs for discussion with students. This is a crucial point especially in the local setting of Indonesia where teaching staffs' time for students is limited by other activities such as teaching load, administrative duties, research and social responsibility. Prior study asserted that student activity has the highest effect on graduates' competencies (Patria, 2013).

Other aspect that should be noted from the study activity factor is that higher education institutions should facilitate students' contact with alumni. Student contact with alumni could be in the form of a career day or a seminar with alumni as key speaker. This activity will introduce students to their future career and possibly open up new knowledge about their fields. Higher education institutions should also encourage students to do internships in order to get some experience in a real employment condition. This activity is also an opportunity to relate what students have learnt into the practice in the world of work. Prior study suggested that sending students into the world of practice from the beginning is the best way to prepare students for the complex reality of the practice and enabling them to learn to deal with unpredictable conflict situations (Schön cited in Vaatstra & De Vries, 2007). Vaatstra and De Vries (2007) further added that students who apply knowledge from different disciplines to realistic problems or cases are better prepared for the workplace than students who have little direct experience of realistic cases.

4.4 Limitations of the study

There are some shortcomings that should be considered in this study. The non-experimental design of the study is the most obvious limitation. In non-experimental design, the non-controlled variable could obstruct the real relation of the hypothesized condition. However, the use of survey data in this study also has few advantages. Studies done with survey data ensure a greater generalization of the result because the data consisted of more samples with a variety of backgrounds.

With the use of self-rating or self-reporting data there is always some concern about accuracy, subjectivity and bias (Eva, Cunnington, Reiter, Keane, & Norman, 2004; Rozenblit & Keil, 2002). The respondents might be underestimating or overestimating their response for certain reasons. It should be noted that graduates retrospectively rated their responses an average 6.5 years after graduation. The accuracy of the rating might weaken over the time span. Nevertheless, previous research has argued that self-reported measurements can be used as proxies of direct measurement (Judge, Cable, Boudreau, & Bretz, 1995; Schmidt & van der Molen, 2001).

The analysis of the model showed that the development of competencies is significantly affected by the condition of learning environment. Nevertheless, the effect is small. This indicates that competencies are a complex construct and not only affected by learning environment. In their study of learning environment and career success, Vermeulen and Schmidt (2008) stated that the learning environment influences competencies mediated by other factors. The quality of the learning environment would influence students' motivation to learn, which would encourage them to achieve and be involved in extra-curricular activities. The active involvement in extra-curricular activities would facilitate students acquiring competencies (Vermeulen & Schmidt, 2008). It is also possible that learning environment influences other domains of competencies which are not measured by the competencies listed in this study. This however needs to be confirmed by further research.

4.5 Further research

The first obvious idea for further research is to include a more comprehensive measurement. The learning environment measurement should include more indicators. In other studies (e.g. Patria, 2013; Vaatstra & De Vries, 2007), learning environment was measured by 18 indicators which were represented by five factors. A better, more objective measurement is crucial to have deeper understanding of the impact of learning environment on study outcomes.

Future follow-up studies should also include more variables affecting graduates' competencies. In this study, learning environment accounts for 8% of the variance in graduates' competencies. Therefore further study should include more predictors that related to graduates' competencies such as: students' characteristics, prior knowledge, ability, motivation and conception of learning (Biggs, 1989; Vermeulen & Schmidt, 2008).

Another interesting follow-up study would be a panel survey, in which graduates' data were collected at different moments in time. For example graduates could evaluate their learning environment just after graduation and then a few years later, after they are employed, they would be asked to provide data regarding their competencies and employment conditions. This set up would provide a more accurate evaluation on learning environment as well as better information about graduates competencies and current employment condition.

5. Conclusion

This study showed that learning environment has positive impact on graduates' competencies. A better learning environment leads to better stimulation for student learning. A better learning environment, for example with the implementation of the student-centred learning principles, will expose students to more complex learning situations which in turn will develop their competencies. The notion that students have to be more responsible for their learning makes it impossible to be passive in the learning process. The role of teacher as a facilitator promotes a more equal relationship between students and the teacher. This will promote the elaboration of learning processes, such as more intense discussion about the course content. More discussion in the course, besides adding the mastery of the course content, encourages students to practice the necessary skills that are necessary in their future employment such as leadership, problem-solving skills, negotiation, working in a team, critical thinking and communication skills.

6. References

Allen, J., & Van Der Velden, R. (2007). Transition from higher education to work. In U. Teichler (Ed.), *Careers of university graduates: Views and experiences in comparative perspectives* (pp. 55-77). Netherlands: Springer. http://dx.doi.org/10.1007/978-1-4020-5926-1_4

Altbach, P. G., Reisberg, L., & Rumbley, L. E. (2009). *Trends in global higher education: Tracking an academic revolution*. Paris: UNESCO

Arbuckle, J. L., & Wothke, W. . (1999). *Amos 4.0 user guide*. Chicago: Smallwaters corporation.

Biggs, J. B. (1989). Approaches to the enhancement of tertiary teaching. *Higher Education Research & Development, 8*(1), 7-25. http://dx.doi.org/10.1080/0729436890080102

Boyapati, E. (2000). Learning: Student-centred vs teacher-centred. *Korean Journal of Chemical Engineering, 17*(3), 365-367. http://dx.doi.org/10.1007/BF02699054

Brandes, D., & Ginnis, P. (1986). *A guide to student-centred learning*. London: Basil Blackwell Ltd.

Breen, R., & Lindsay, R. (1999). Academic research and student motivation. *Studies in Higher Education, 24*(1), 75-93. http://dx.doi.org/10.1080/03075079912331380158

Brennan, J., Kogan, M., & Teichler, U. (1996). Higher education and work: A conceptual framework. In J. Brennan, M. Kogan & U. Teichler (Eds.), *Higher education and work* (pp. 1-24). Pennsylvania: Jessica Kingsley Publisher.

Brown, T. A. (2006). *Confirmatory factor analysis for applied research*. New York: The Guilford Press.

Brush, T., & Saye, J. (2000). Implementation and evaluation of a student-centered learning unit: A case study. *Educational Technology Research and Development, 48*(3), 79-100. http://dx.doi.org/10.1007/BF02319859

Cannon, R., & Newble, D. (2000). *A guide to improving teaching methods: A handbook for teachers in university and colleges*. London: Kogan Page.

DiStefano, C., Zhu, M., & Mindrila, D. (2009). Understanding and using factor scores: Considerations for the applied researcher. *Practical Assessment, Research & Evaluation, 14*(20), 1-11.

Dolton, P. J., & Makepeace, G. H. (1990). Graduate earnings after six years: Who are the winners? *Studies in Higher Education, 15*(1), 31-55. http://dx.doi.org/10.1080/03075079012331377581

Eva, K. W., Cunnington, J. P. W., Reiter, H. I., Keane, D. R., & Norman, G. R. (2004). How can I know what I don't know? Poor self asessment in a well-defined domain. *Advances in Health Sciences Education, 9*(3), 211-224. http://dx.doi.org/10.1023/B:AHSE.0000038209.65714.d4

Finlay, S.-J., & Faulkner, G. (2005). Tete a Tete: Reading groups and peer learning. *Active Learning in Higher Education the Journal of the Institute for Learning and Teaching, 6*(1), 32-45. http://dx.doi.org/10.1177/1469787405049945

Glass, G. V., & Maguire, T. O. (1966). Abuses of Factor Scores. *American Educational Research Journal, 3*(4), 297-304. http://dx.doi.org/10.3102/00028312003004297

Hair, J., Black, W., Babin, B., & Anderson, R. (2010). *Multivariate data analysis* (7th ed.). New Jersey: Prentice-Hall, Inc.

Hall, R. J., Snell, A. F., & Foust, M. S. (1999). Item parceling strategies in SEM: Investigating the subtle effects of unmodeled secondary constructs. *Organizational Research Methods, 2*(3), 233-256. http://dx.doi.org/10.1177/109442819923002

Judge, T. A., Cable, D. M., Boudreau, J. W., & Bretz, R. D. (1995). An Empirical-Investigation of the Predictors of Executive Career Success. *Personnel Psychology, 48*(3), 485-519. http://dx.doi.org/10.1111/j.1744-6570.1995.tb01767.x

Lindsay, R., Breen, R., & Jenkins, A. (2002). Academic esearch and teaching quality: The views of undergraduate and postgraduate students. *Studies in Higher Education, 27*(3), 309-327. http://dx.doi.org/10.1080/03075070220000699

Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning environment and academic outcomes: Implications for theory and practice. *Studies in Higher Education, 27*(1), 27-52. http://dx.doi.org/10.1080/03075070120099359

Mullen, C. A. (2000). Linking research and teaching: A study of graduate student engagement. *Teaching in Higher Education, 5*(1), 5-21. http://dx.doi.org/10.1080/135625100114920

Ng, T. W. H., Eby, L. T., Sorensen, K. L., & Feldman, D. C. (2005). Predictors of objective and subjective career success: A meta-analysis. *Personnel Psychology, 58*(2), 367-408. http://dx.doi.org/10.1111/j.1744-6570.2005.00515.x

Norman, G. R., & Schmidt, H. G. (2000). Effectiveness of problem-based learning curricula: Theory, practice and paper darts. *Medical Education, 34*(9), 721-728. http://dx.doi.org/10.1046/j.1365-2923.2000.00749.x

Nusche, D. (2008). *Assessment of learning outcomes in higher education: a comparative review of selected practices*. Paris: OECD Publishing. http://dx.doi.org/10.1787/244257272573

Patria, B. (2013). Learning environment and graduates' transition period. *International Journal of Research Studies in Education, 2*(1), 25-40. http://dx.doi.org/10.5861/ijrse.2012.85

Rozenblit, L. R., & Keil, F. C. (2002). The misunderstood limits of folk science: an illusion of explanatory depth. *Cognitive Science, 26*, 521-562. http://dx.doi.org/10.1207/s15516709cog2605_1

Rumberger, R. W., & Thomas, S. L. (1993). The economic returns to college major, quality and performance: A multilevel analysis of recent graduates. *Economics of Education Review, 12*(1), 1-19. http://dx.doi.org/10.1016/0272-7757(93)90040-N

Schmidt, H. G., & van der Molen, H. T. (2001). Self-reported competency ratings of graduates of a problem-based medical curriculum. *Academic Medicine, 76*(5), 466-468. http://dx.doi.org/10.1097/00001888-200105000-00018

Teichler, U. (1999). Research on the relationships between higher education and the world of work: Past achievements, problems and new challenges. *Higher Education, 38*(2), 169-190. http://dx.doi.org/10.1023/A:1003761214250

Teichler, U. (2007). Graduate Employment and Work: Various Issues in a Comparative Perspective. In U. Teichler (Ed.), *Careers of university graduates: Views and experiences in comparative perspectives* (pp. 1-14). Dordrecht: Springer. http://dx.doi.org/10.1007/978-1-4020-5926-1_1

Teichler, U. (2008). *The future of graduate employment and work and the implications for higher education* Paper presented at the OECD/France International Conference. Higher Education to 2030: What Futures for Quality Access in the Era of Globalisation?

Vaatstra, R., & De Vries, R. (2007). The effect of the learning environment on competences and training for the workplace according to graduates. *Higher Education, 53*(3), 335-357. http://dx.doi.org/10.1007/s10734-005-2413-4

Vermeulen, L., & Schmidt, H. G. (2008). Learning environment, learning process, academic outcomes and career success of university graduates. *Studies in Higher Education, 33*(4), 431-451. http://dx.doi.org/10.1080/03075070802211810