Anima, Indonesian Psychological Journal
2011, Vol. 26, No. 4, 281-286

The Flow Inventory for Student: Validation of The LIS

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Limitations of the academic flow instrument developed so far became the basis of this research. The validated academic flow instrument is the the FLow Inventory for Student (LIS), consisting 12 items representing absorption, enjoyment, and intrinsic motivation aspects. The LIS aspects were based on the aspects of Work-reLated Flow Inventory (WOLF), developed by Bakker (2008). The validation was based on content evidence and internal structural analysis, while the reliability refers to alpha Cronbach internal consistency. Undergraduate students (*N*=306) were participating through incidental sampling. Exploratory factor analysis results reveal that LIS consist of 10 items containing four items of absorption, three items of enjoyment, and three items of intrinsic motivation. These items have factor loading > .4 with no cross loading indication. The reliability score using alpha Cronbach internal consistency is > .6. The results are discussed further.

Keywords: flow, the FLow Inventory for Student (LIS)

Keterbatasan alat ukur flow akademik yang dikembangkan selama ini mendasari penelitian validasi alat ukur flow akademik. Alat ukur flow akademik yang diuji validasi dinamakan The FLow Inventory for Student (LIS), yang terdiri atas 12 butir mewakili aspek absorption, enjoyment, dan intrinsic motivation. Aspek-aspek LIS didasarkan pada aspek alat ukur Work-reLated Flow Inventory (WOLF) yang dikembangkan Bakker (2008). Validasi meliputi pengujian validitas berdasarkan bukti content dan internal structural analysis serta reliabilitas mengacu pada internal consistency alpha cronbach. Subjek penelitian berjumlah 306 mahasiswa yang diperoleh melalui incidental sampling. Hasil uji analisis faktor exploratory menunjukkan LIS terdiri atas 10 butir dengan komposisi empat butir absorption, tiga butir enjoyment, dan tiga butir intrinsic motivation. Butir-butir tersebut memiliki factor loading > 0,4 dan tidak ada indikasi *cross loading*. Reliabilitas internal consistency alpha cronbach LIS > .6. Hasil penelitian didiskusikan lebih lanjut.

Kata kunci: flow, the FLow Inventory for Student (LIS)

Csikszentmihalyi (1990) developed the flow concept which means an individual's total involvement in his/her activities, full of contentment, which do not require external reward due to his/her internal motivation. In general the flow definition consisting three components, namely absorption, enjoyment, and intrinsic motivation (Bakker, 2008). According to Bakker, some researchers, who's flow definition contain absorption, enjoyment, and intrinsic motivation are Csikszentmihalyi, Tathunde and Whalen, and Larson and Richards. The author defines flow as a condition experienced by individuals, consisting absorption, enjoyment, and intrinsic motivation.

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Csikzentmihalyi (1990) mentions that flow is characterized by the challenge-skill balance, merging of action and awareness, clear goals, unambiguous feedback, concentration on the task at hand, sense of control, loss of self-consciousness, and transformation of time. Csikszentmihalyi noted several characterized overlapping among aspects and factors supporting occurrence of flow. For example, merging of action and awareness, concentration on the task at hand, loss of self-consciousness is the characteristic of flow that can be combined into absorption. Whereas challenge-skill balance, clear goals, unambiguous feedback, sense of control is the occurrence factor of flow based on a review from Job Demands-Resources Model (JD-R Model) theory (Bakker & Demerouti,

2007). Challenge-skill balance, clear goals, unambiguous feedback, sense of control included into job resources which support the occurance of flow condition.

Based on the flow aspects review that Csikszentmihalyi noted, the author chose to address the three components of flow, namely absorption, enjoyment, and intrinsic motivation. Absorption is the condition of the individual as being able to totally focus on what is being done so that individuals are not easily distracted from his/her work, time was felt as passing faster. Enjoyment is feeling comfortable and happy when doing a task (Bakker, 2008). Intrinsic motivation is interest in a task that comes from oneself. Enjoyment and intrinsic motivation includes in the positive emotional response (Schmidt, Shernoff & Csikzentmihalyi, 2007).

Flow is one of the positive experience condition which is part or area of positive psychology. Besides positive experience, there are still positive individual traits and positive institutions in positive psychology. Positive psychology study positive things such as strength and value that can develop individual skills rather than fiddling with weakness or lack of individuals (pathological psychology) (Nelson & Simmons, 2003).

Flow has a major positive impact on performance and outcome of individual behavior. Positive impact on various areas of life, such as academic, work, interpersonal relationships, sports, religion, music, and sexual (Bakker, 2005; Csikszentmihalyi, 1990). In the academic area, flow is required to perform academic activities such as attending, learning, and doing a task. When performing academic activities, students have to concentrate or focus on the undertaken activities, feel comfortable when working on task, and have working motivation that based on intrinsic motivation (Yuwanto, Budiman, Siandika, & Prasetyo, 2011)

Methodologically flow can be measured by two methods. Measuring method of flow using self report in the form of questionnaires and through the measurement of behavior. One example of flow measuring questionnaires is flow in the work situation developed by Bakker (2008). Flow questionnaire on academic area was developed by Yuwanto, Budiman, Siandika, and Prasetyo (2011). Measuring flow through behavior measurement, for example through observation of body posture while working on an activity by D'Mello, Taylor, Tapp, King, and Graesser (n.d.). There are differences on body posture when the individual is at the flow conditions and saturated conditions.

Bakker (2008) develop a flow instrument in work situation, called The WOrk-reLated Flow inventory (WOLF). Bakker validating WOLF using 1346 samples of workers. WOLF originally consisted of 16 items that reveal the flow in the work situation. These items were prepared based on Bakker logical considerations and five organizational psychologist reviewed the content of each item. Each item have 7 responses (1 = never, 7 = always).

Table 1
Academic Flow Instrument Factor Loading

Aspect	Items	*Factor Loading*
Absorption	1	.817
	3	.554
	6	.707
	11	.870
Enjoyment	5	.822
	7	.796
	9	.921
	12	.923
Intrinsic Motivation	2	.821
	4	.748
	8	.610
	10	.495
Flow	Absorption	.826
	Enjoyment	.846
	Intrinsic Motivation	.880

Based on exploratory factor analysis and reliability analysis testing using SPSS, WOLF total item become 13. Validation results found three dimensions of flow with capability to explain 65% of varians. Those three dimentions are absorption, work enjoyment, and intrinsic work motivation. Absorption consist of four items and able to explain 10% varians. Work enjoyment consist of four items and able to explain 46% varians. Intrinsic work motivation consist of five items and able to explain 9% varians. All items has factor loading values ranged from .46 to .85 and has no cross loading (Bakker, 2008).

Results of WOLF reliability testing using test-retest reliability based on 248 samples of workers. Test-retest conducted in a span of six weeks after the first measurement. The result of test-retest reliability are .74, .77, and .71 for absorption, work enjoyment, and intrinsic work motivation. These findings indicate WOLF has a good test-retest reliability (Bakker, 2008).

WOLF serves to measure flow state in the context of work. Flow state in academic context was measured by academic flow instrument. One of the academic flow instrument was developed by Yuwanto, Budiman, Siandhika, and Prasety (2011). This instrument is based on the flow aspect from Bakker which consists of absorption, enjoyment, and intrinsic motivation. This study used 200 undergraduate students as subjects. Yuwanto,

et al research actually was not focusing on developing academic flow instrument, but to measure academic flow. Yuwanto, et al research purpose is to test the relationship between academic stress and academic flow. Thus explanation about academic flow instrument validation did not become the research focus. This academic flow instrument consists of 12 items with details as follows. Absorption consists of items number 1, 3, 6, and 11. Enjoyment consists of items number 5, 7, 9, and 12. Intrinsic motivation consists of items number 2, 4, 8, and 10. This instrument has validity based on content and internal structure analysis which tested by using confirmatory factor analysis. Factor loading values ranged from .495 - .923. Reliability of this instrument using reliability alpha cronbach with results .887. Table 1 shows factor loading of academic flow instrument developed by Yuwanto, et al.

Internal structural analysis result of academic flow instrument using *confirmatory factor analysis* conducted by Yuwanto, et al (2011) indicate cross loading on some items. Table 2 shows some items that has cross loading. Based on Table 2, bold printed factor loading is the highest factor loading on the aspects of flow.

Factor loading on each item in each aspect has fairly good value (> .4). The absence of factor loading below .4 indicate good convergent validity. The next step is assess the discriminant validity through cross loading factor. Items with cross loading marked with an asterisk. For example, item 1 have cross loading between absorption (.8175) and *intrinsic motivation* (.4883). Item 4 have cross loading between enjoyment (.4601) and *intrinsic motivation* (.7489). Item 9 have cross loading between absorption (.4956), enjoyment (.9210), and *intrinsic motivation* (.5268). Cross loading has adverse implications for discriminant validity.

Table 2
Factor Loading and Cross Loading Items on Academic Flow

Items	Absorption	Enjoyment	Intrinsic Motivation
1*	.8175	.3927	.4883
2*	.6077	.6371	.8217
3*	.5547	.3697	.4140
4*	.3999	.4601	.7489
5*	.4526	.8229	.5914
6	.7072	.3119	.2925
7*	.3726	.7967	.5218
8	.3934	.2821	.6101
9*	.4956	.9219	.5268
10	.1453	.2845	.4958
11*	.8703	.4893	.5775
12*	.4943	.9238	.5770

Note. * = cross loading

Table 3
FLow Inventory for Student (LIS) Blueprint

Indicator	Items
Absorption	1, 3, 6, 11
Enjoyment	5, 7, 9, 12
Intrinsic Motivation	2, 4, 8, 10

Based on the limitations of academic flow instrument developed by Yuwanto, et al (2011), the author conducted re-validation of the academic flow instrument. Instrument used in this study is an instrument developed by Yuwanto, et al. This academic flow instrument named *The fLow Inventory for Student* (LIS). This validation test involves validity test and reliability test so that academic flow instrument has good quality of validity and reliability This LIS inventory is distinctive from the instrument developed by Yuwanto, et al. The research was also conducted due to the lag of literature containing any flow measuring device with an academic standard.

Method

The subject of this study were students of the Faculty of Psychology University of Surabaya, which is obtained through incidental sampling method (*N*= 306). This research is a instrument validation research. The test of validity using content and internal structural analysis evidence (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999). Evidence of content is measured using the analysis of the suitability of content to the construct to be measured. Evidence of content is done by checking the suitability of the content and meaning of items with the construct to be measured.

Evidence of *internal structural analysis* was obtained using exploratory factor analysis. First step of factor analysis was conducting a feasibility factor analysis testing using KMO and Bartlett's Test. The requirement is KMO value > .5 and Bartlett's Test value < .05. At the factor formation stage, factor analysis result was conducted with the condition of *Initial Eigen values* value > 1 and *cumulative* % value > 50% on factor component (Hair, Anderson, Tatham, & Black, 1998). Reliability test used the Cronbach alpha internal consistency method. Table 3 shows the blueprint of The fLow Inventory for Student (LIS) and Table 4 shows items on LIS, which consists of favorable items with four responses (Very appropriate

Table 4
LIS Items

No	Pernyataan (in Indonesia)	Statement (In English)
1	*Saya dapat berkonsentrasi saat belajar dan mengerjakan tugas*	I can concentrate while studying and doing my tasks
2	*Saya memiliki semangat yang tinggi saat belajar dan mengerjakan tugas*	I have high spirit while studying and doing my tasks
3	*Saat belajar dan mengerjakan tugas saya tidak mudah terganggu dengan keadaan di sekeliling saya*	While studying and doing my task, I am not easily disturbed by the circumstances around me
4	*Saya belajar dan mengerjakan tugas untuk mengembangkan diri*	I am studying and doing my task to develop myself
5	*Mengerjakan tugas atau belajar memberi saya perasaan yang menyenangkan*	Doing my task or studying give me a good feeling
6	*Saya berkonsentrasi sepenuhnya ketika belajar dan mengerjakan tugas*	I concentrate fully when studying and doing my task
7	*Saya merasa nyaman selama mengerjakan tugas dan belajar*	I feel comfortable when doing my task and studying
8	*Saya belajar dan mengerjakan tugas bukan dari dorongan orang lain*	I am studying and doing my task not because encouragement from the others
9	*Saya mengerjakan tugas dan belajar dengan penuh kegembiraan*	I am doing my task and studying with joyfullness
10	*Saya menyadari bahwa saya juga ingin belajar dan mengerjakan tugas di waktu luang saya*	I realize that I want to study and do my task on my spare time
11	*Saya mampu fokus mengerjakan tugas dan belajar*	I can focus when doing my task and studying
12	*Saya merasa gembira saat belajar dan mengerjakan tugas*	I feel happy when studying and do my task

= 4, Appropriate = 3, Not appropriate = 2, Very not appropriate = 1)

Result and Discussion

Result from KMO testing shows value of .844,which is greater than .5 and Bartlett's Test value of .000 is smaller than .05KMO and Bartlett's Test value meet the requirements of factor analysis. Table 5 describe the value of *Initial Eigen values* from exploratory factor analysis.

Refering to Table 5, total value on Initial Eigenvalues from the factor analysis show that there are three factor components formed. Based on this value, it is recommended that three factors was formed. Refering to cumulative percentage which reach 50% on the third component, then it is recommended that three factors was formed (Hair, Anderson, Tatham, & Black, 1998). Initial *Eigen values* dan cumulative % result show that the three factors formed are in accordance with the total academic flow aspects based on Wolf's flow instrument developed by Bakker (2008). Factor 1 explains 36.3% variance, Factor 2 explains 12.6% variance, and Factor 3 explains 8.7% variance.

Table 6 reveals the value of factor loading of each item. Items qualified to construct a factor must have factor loading value > .4 (Hair, Anderson, Tatham, & Black, 1998) and has no cross loading. Item 2 and 7

Table 5
Initial Eigen values Values From Exploratory Factor Analysis

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	4.356	36.301	36.301
2	1.516	12.634	48.935
3	1.048	8.736	57.671
4	.917	7.645	65.316
5	.874	7.281	72.597
6	.758	6.315	78.912
7	.619	5.155	84.067
8	.527	4.393	88.460
9	.411	3.425	91.885
10	.388	3.232	95.117
11	.360	2.998	98.115
12	.226	1.885	100.000

has cross loading on factor 1 and 2. A good factor should have minimally 3 items. All factors formed consists of more than 3 items. Table 7 is the factor component after discarding items 2 and 7.

Factor 1 consist of items 5, 9, and 12, each of those items has a factor loading score above .4. Factor 2 consist of items 1, 3, 6, and 11, each of those items has a factor loading score above .4. Factor 3 consist of items 4, 8, and 10, each of those items has a factor loading score above .4. Thus LIS has good convergent validity and discriminant validity. Based on blueprint, items 5, 9, and 12 are items that represent enjoyment aspect. Items 1, 3, 6, and 11 are items that represent

absorption aspect. Items 4, 8, and 10 are items that represent intrinsic motivation aspect.

When compared with previous studies conducted by Yuwanto, et al (2011), in this research only item 2 and 7 which had cross loading. Item 2 "*Saya memiliki semangat yang tinggi saat belajar dan mengerjakan tugas"*= I have high spirit while studying and doing my task) actually represent intrinsic motivation aspect and had cross loading with absorption aspect. Based on its content, item 2 less clearly represented intrinsic motivation aspect. Intrinsic motivation leads to the stimulant source for doing activity which comes from oneself. Item 2 refers to how much psychic energy possessed when working on academic tasks, thus allowing close relationship between intrinsic motivation component and other components of the flow, in this case the absorption aspect. It is possible to measure absorption since individuals can focus on a task when has passion doing that task (Shernoff & Csikszentmihalyi, 2008).

Item 7 actually represent enjoyment aspect and had cross loading with absorption aspect. Item 7 (*"Saya merasa nyaman selama mengerjakan tugas dan belajar"* = I feel comfortable during doing my task and studying) based on its content can be classified to measure absorption aspect. Csikszentmihalyi (1990) stated that merging of action and awareness as a depiction of individual immersed towards need of comfortness from a task. According to the researcher, keyword comfortness have a measure ambiguity of

Table 6
Factor Analysis Result

Item	Factor 1	Factor 2	Factor 3
Item 1	.189	.766	.076
Item 2	.596	.429	.126
Item 3	.096	.472	.049
Item 4	.243	.085	.704
Item 5	.830	.136	.068
Item 6	.182	.710	.132
Item 7	.518	.482	.121
Item 8	-.195	.393	.605
Item 9	.824	.139	.165
Item 10	.262	-.082	.596
Item 11	.164	.807	-.031
Item 12	.835	.194	.178

Tabel 7
Factor Component

Item	Factor 1	Factor 2	Factor 3
Item 1		.776	
Item 3		.510	
Item 4			.696
Item 5	.829		
Item 6		.714	
Item 8			.645
Item 9	.831		
Item 10			.570
Item 11		.830	
Item 12	.837		

Table 8
LIS Items After Validation

Flow Aspects	Pernyataan (In Indonesia)	Statement (In English)
Absorption	*Saya dapat berkonsentrasi saat belajar dan mengerjakan tugas*	I can concentrate while studying and doing my tasks
	Saat belajar dan mengerjakan tugas saya tidak mudah terganggu dengan keadaan di sekeliling saya	While studying and doing my task, I am not easily disturbed by the circumstances around me
	Saya berkonsentrasi sepenuhnya ketika belajar dan mengerjakan tugas	I concentrate fully when studying and doing my task
	Saya mampu fokus mengerjakan tugas dan belajar	I can focus when doing my task and studying
Enjoyment	*Mengerjakan tugas atau belajar memberi saya perasaan yang menyenangkan*	Doing my task or studying give me a good feeling
	Saya mengerjakan tugas dan belajar dengan penuh kegembiraan	I do my task and study with joyfullness
	Saya merasa gembira saat belajar dan mengerja-kan tugas	I feel happy when studying and doing my task
Intrinsic Motivation	*Saya belajar dan mengerjakan tugas untuk mengembangkan diri*	I study and do my task to develop my self
	Saya belajar dan mengerjakan tugas bukan dari dorongan orang lain	I study and do my task not because encouragement from the others
	Saya menyadari bahwa saya juga ingin belajar dan mengerjakan tugas di waktu luang saya	I realize that I want to study and do my task only on my spare times

absorption and enjoyment.

LIS reliability test result using alpha cronbach method shows alpha value of .765 (total reliability score). The result of this testing fulfill the reliability requirement (> .6), therefore it can be concluded that the LIS academic flow instrument has good reliability. Validity testing based on internal LIS structural analysis evidence has also a good validity. Items that represent *absorption*, *enjoyment*, and *intrinsic motivation* aspect only measure the represented aspects. Table 8 shows LIS items after validation.

Conclusion

In conclusion, the validation results show that LIS is a reliable instrument for measuring the flow construct and its three aspects (absorbtion, enjoyment, and intrinsic motivation). Thus the LIS is an improvement of the previously developed flow inventory reported by Yuwanto et al. (2011)..

As the current study is limited to evaluating the internal structure of LIS, future studies need to be conducted to further validate the instrument by examining the *response process*, *relationship to other variables*, or *consequences* evidence. Reliability testing can also be developed with *test-re-test reliability* design. There are needs to enrich academic flow instrument development considering the limited number of academic flow instrument that is available at the moment.

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