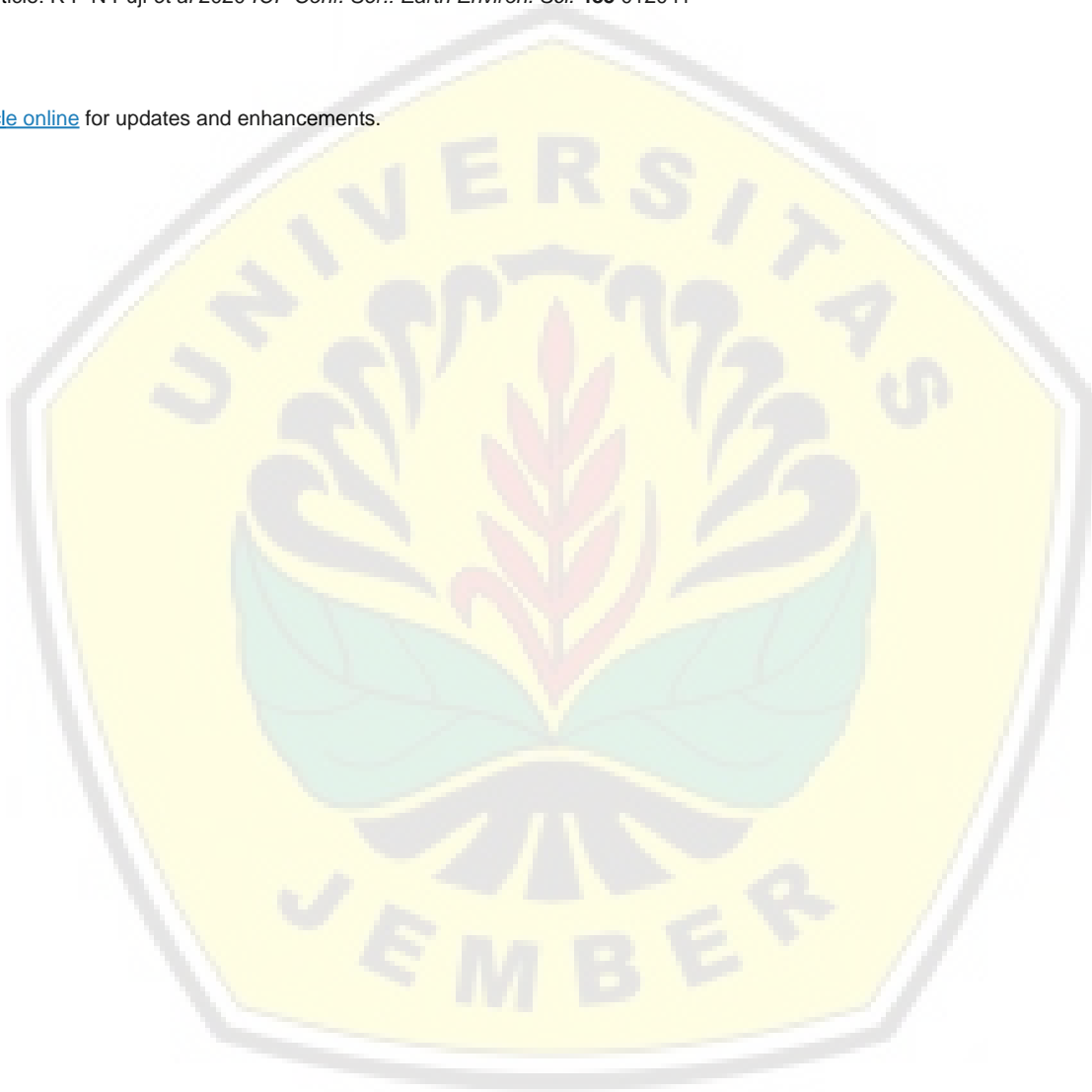


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## The Students' Prior Knowledge at The Department of History Education within Tertiary Education

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**Abstract.** Prior knowledge is the knowledge acquired by students before gaining novel knowledge. This study aims to identify students' prior knowledge at the Department of History Education within university setting. The study applied descriptive statistics with the aid of SPSS. The sample involved in this study was 101 freshmen. The results showed that the students' prior knowledge was rather low. This was indicated by the score tests showing that the average student were not able to reach the minimum passing criteria. Factual knowledge was found to be at excellent level. The findings highlight the need for schools and higher education institutions to identify students' prior knowledge to better identify their strengths and weaknesses.

### 1. Introduction

Every individual has different characteristics, compared to one another. These differences germane to individual characteristics encompass cognitive, skills, personality, learning experiences, physical and others. All of these differences can have an impact on their learning outcomes, attitudes and other tendencies that will emerge as a result of reflection. Students' strengths and weaknesses can be a supporting and inhibiting factor for their learning success [24]; [25]. One particular difference lies in cognitive facet, which will be improved, when students with high cognitive abilities are able to collaborate with those having low cognitive abilities. Heterogeneous grouping offers benefits for building good knowledge coordination between students of different cognitive abilities [1]; [23]; [26].

One factor that can influence learning success is students' prior knowledge. The identification of students' prior knowledge also involves their learning engagement. Identification of preliminary knowledge needs to be done in concert with providing feedback on students' performance and align instructional design with the resultant analyses. The assessment of students' prior knowledge has several objectives, including 1) identifying their learning experience; (2) finding instructional designs appropriate to students' learning experiences; (3) providing feedback on students' development; (4) bridging the gap between teachers' expectations and students' knowledge; (5) grouping students according to their abilities. The analysis of students' prior knowledge helps teachers to be aware of the fact that prior knowledge has a different relevance to every student's learning achievements. Teachers need to develop well-integrated knowledge to go beyond teaching mere factual knowledge. This can be done by building students' initial knowledge through identifying the relationship of several subjects with the ideas presented [2].

Prior knowledge is a dynamic, multidimensional, and hierarchical arrangement which consists of various types of knowledge and skills [4]. Prior knowledge is considered to bear a positive effect on applying high-level cognitive problem solving skills [5]. Before identifying prior knowledge, teachers need to fully understand what kind of prior knowledge to be identified. Specific type of prior knowledge needs to be determined because each type has a different impact on student achievement.

Assessment of detailed prior knowledge provides detailed information about students' abilities and competencies. Teachers should be able to identify students' potential. This has become one of the challenges and tasks that need to be fulfilled by teachers. Teachers should be equipped with training in applying and evaluating the implementation of the learning process. This provides benefits for decision making and supports improvement of learning experience [3] [5] [6].



The students' prior knowledge is known to be correlated with their mental and psychological circumstance. One of the mental and psychological conditions of students is their interest and motivation. Prior knowledge has a linear relationship that is synonymous with initial knowledge [7]. Students will tend to involve a deeper cognitive process when they engage with interesting tasks compared to simple tasks. As such, teachers should be able to stimulate broader associative networks and lead students' learning to positive emotion [7].

Prior knowledge also has other impacts on students' interests and motivations, which can be either positive or negative. The possible negative impact is students' declined learning intensity in acquiring new knowledge. Individuals with low level of prior knowledge have an interest in learning new things and high amount of knowledge compared to those who have substantial level of prior knowledge. This is because individuals who have prior knowledge already have an initial picture of what they will learn, compared to those who have low prior knowledge levels. Individuals who have low prior knowledge will be compelled to discover new things [8]; [11]. This has become one of the negative impacts when it comes to improving students' prior knowledge. Prior knowledge also seems to have a negative impact, in addition to its positive impact in maintaining learning effectiveness [9]. Teachers should be able to find a solution to overcome the negative impacts related to students' prior knowledge.

Students should also participate in identifying their prior knowledge. The ability to independently identify prior knowledge can aid them in assessing their strengths and weaknesses. Students' ability to assess their own performance accurately can enable them to organize their own learning through metacognitive mechanism. Students who have high level of prior knowledge are able to conduct metacognitive self-assessments better than those with moderate level of prior knowledge [10]. This concludes that knowledgeable students are superior to those with marginal prior knowledge. Students with extensive prior knowledge have a tendency to showcase or prove their knowledge and abilities in the classroom [10]. This fosters their confidence because they feel they have more knowledge compared to their counterparts.

Identification of prior knowledge can be done by asking a number of fundamental questions, giving quizzes, and conducting tests related to particular material. Teachers will evaluate students' responses based on the instruments operationalized. Batteries for testing students' prior knowledge can be designed according to their learning needs. Prior knowledge can be a means for recalling knowledge that students have previously obtained. Demirel, M., & Coşkun, Y. D have conducted research on the identification of prior knowledge in domains related to Bioethics by involving 277 students in a secondary school. The developed instrument identified students' interest in the topic and general knowledge. Assessment on prior knowledge helped students to come up with arguments and arrange ideas in those arguments. The results showed that there was a significant relationship between students' interests in certain topics with their prior knowledge [13].

The level of prior knowledge also influences students' learning readiness [13]. A study of prior knowledge is also carried out by linking it with students' psychological circumstance. This research was conducted by identifying students' knowledge through their writing abilities. The results demonstrated that students who had prior knowledge on a particular material were able to write material they were familiar with and employed more diverse array of meanings compared to students with basic skills and low prior knowledge. This is manifest through the results of students' writing during the evaluation process. Students who have high prior knowledge create more robust and richer writing, with regard to meaning and content, than those with low prior knowledge [14]. This study also shows that students with high prior knowledge have higher critical thinking skills [14].

Prior knowledge needs to be supported by several aspects, such as learning methods, approaches, learning resources and learning media. Learning methods have strong potential to students' prior knowledge. Collaborative learning is one of methods to allow the opportunities for students to exchange ideas and transfer of knowledge between group members. Student learning outcomes also improve when collaborative learning is at play, compared to individual assignments [15]. Their prior knowledge can be optimally evaluated with the support of effective learning methods. Learning methods also become one supporting factor to learning outcome. The evaluation results of prior knowledge are also taken into consideration when choosing appropriate learning methods according to the prior knowledge level of students [16]. There are several factors that affect the social, psychological and environmental conditions of students [27]; [28]; [29]; [30]; [31]; [32].

Some learning methods that involve students in high-order thinking skills and problem solving will be one alternative trajectory to connecting and stimulating students' prior knowledge and novel knowledge. Students partake in the process of integrating initial knowledge to assimilate new knowledge. When learning particular subject, mental efforts of students with low prior knowledge tend to be higher compared to those who master high prior knowledge [21].

Prior knowledge poses bearing impact on and is strongly associated with students' learning process in managing new information and knowledge in their cognitive structures. New knowledge that will be obtained by students can be facilitated by assigning such tasks as writing essays, making work products, etc.

Students use their prior knowledge in various ways. Some students will try to adjust the prior knowledge with new learning situations to gain new knowledge. Learners will try to assimilate prior knowledge and new knowledge, which will lead to integrated understanding [17].

Previous research shows that students' prior knowledge has a significant relationship with students' reading comprehension. This implies that high knowledge acquisition can accrue accurate reading comprehension. These two constructs have been acknowledged to have strong correlation. Students need to be directed to have high prior knowledge, which subsequently leads to high performance in reading comprehension. This does not indicate that students who have low prior knowledge are inferior in terms of linguistic proficiency [20]

Prior knowledge is different to the level of initial learning. Students' prior knowledge is obtained before students partake in learning process. Experts assume that prior knowledge can influence the level of students' initial learning if the prior knowledge is strongly associated with the initial learning to be learned [18]. Prior knowledge becomes the bedrock to learning new knowledge. In this regard, teachers need to facilitate the acquisition of new knowledge by showing what students already know about certain subject and connecting new knowledge with their prior knowledge [19]. Students' preparedness also becomes one of the determining factors in driving their learning success.

## 2. Methods

This study aimed to identify students' prior knowledge of students in the Department of History Education. The sample involved in this study was students in the first semester. The following table shows the number of samples involved in this study.

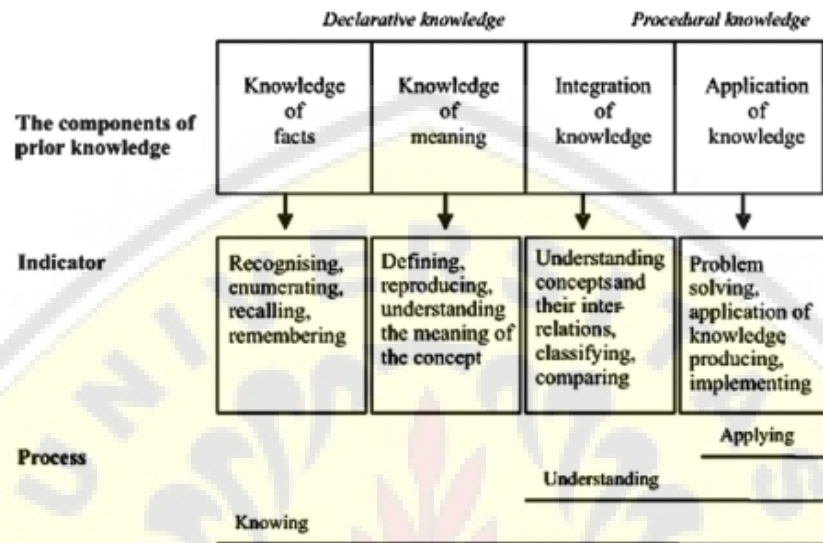
**Table 1.** Sample Description

No	Demographic Data	Number	Percentage%
1	<b>Gender</b>		
	Male	39	39
	Female	62	61
2	<b>Age</b>		
	17	4	4
	18	57	56
	19	37	37
	20>	3	3
3	<b>Type of school</b>		
	Private-owned	9	9
	Madrasah Aliyah (Islamic senior high school)	12	12
	State vocational high school	8	8
	Public senior high school	72	71

The study employed questionnaires and interviews to collect data. The instruments were developed in reference to the indicators of students' prior knowledge as proposed by Hailikari, T., Katajavuori, N., & Lindblom-ylanne, S. The indicators of prior knowledge according to Hailikari, T.,



Katajauori, N., & Lindblom-ylanne, S. which include (1) knowledge of facts; (2) knowledge of meaning; (3) Integration of knowledge; (4) application of knowledge [2].



**Diagram 1.** Component of Prior Knowledge by Hailikari, T., Katajauori, N., & Lindblom-ylanne, S

Knowledge of facts is the lowest level of knowledge. The knowledge of facts contains the introduction of certain terms or facts. Knowledge of meaning contains in-depth students' understanding manifest in their ability to describe particular information. Integration of knowledge, at a higher level, directs students to delve into particular information deeper and find differences between concepts. Application of knowledge directs students to do problem solving.

**Table 2.** Instrument Blueprint

No	Indicators	Items	Item number
1	knowledge of facts	Knowledge of founding father of History	1
		Knowledge of the development of Borobudur temple	2
2	knowledge of meaning	The origin of Indonesians' ancestors	3
		Theory concerning the arrival of Hindu and Buda in Indonesia	4
3	Integration of knowledge	The comparison between Daendels' land-rent system and Van den Bosch's enforcement planting	5
4	Aplication of knowledge	The comparison between old order and new order	6
		The motives behind DI/TII rebellion and its solution	7
		The motives behind revolution of 1998 and its solution	8

### 3. Results and Discussion

#### 3.1. The Level of Student's Prior Knowledge

The researchers tested the instruments to 30 students to assess its reliability. The instruments used in this study were questionnaires and tests. The following table displays the reliability of questionnaire and test.

**Table 3.** Reliability Test of Instruments

Questionnaire Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
Item 1	24,7000	15,114	0,512	0,336	0,830	0,839
Item 2	24,5000	16,466	0,350	0,374	0,851	
Item 3	24,6333	15,137	0,751	0,738	0,799	
Item 4	24,2333	16,530	0,576	0,490	0,821	
Item 5	24,8333	15,454	0,501	0,430	0,830	
Item 6	24,7333	15,513	0,741	0,676	0,802	
Item 7	24,8000	15,200	0,605	0,599	0,815	
Item 8	24,7333	15,513	0,679	0,535	0,808	
Test1	59,8833	372,581	0,176	0,171	0,708	0,691
Test2	59,5500	387,954	0,128	0,260	0,712	
Test3	62,0333	343,154	0,498	0,403	0,641	
Test4	60,8667	304,826	0,601	0,541	0,607	
Test5	61,1500	341,416	0,308	0,328	0,681	
Test6	61,5167	331,353	0,458	0,555	0,644	
Test7	60,8500	319,641	0,488	0,461	0,636	
Test8	61,4667	327,895	0,447	0,531	0,646	

Reliability test was related to the consistency of an instrument when used on wide range of samples. In addition, the reliability test also showed the consistency of values obtained by certain instruments in different times and conditions. Based on the data in Table 3, the questionnaire and test demonstrate Cronbach's alpha of 0.839 and of 0.691, respectively. These figures indicate that the instruments have high reliability [22].

The resultant instruments were distributed to 101 participants online. These participants were selected solely because they were all freshmen, which allowed the analysis on their prior knowledge before they were exposed to new knowledge during their study

**Tabel 4.** Descriptive Statistics on Students' Prior Knowledge

Question and Test	N	Min	Max	Mean	S.D	Score	Interpretation
Q1: Knowledge of founding father of History	101	2,00	5,00	3,68	0,88		High
Q2: Knowledge of the development of Borobudur temple	101	1,00	5,00	3,68	0,79		High
Q3: The origin of Indonesians' ancestors	101	1,00	5,00	3,41	0,73		High
Q4: Theory concerning the arrival of Hindu and Buda in Indonesia	101	2,00	5,00	3,81	0,62		High

Question and Test	N	Min	Max	Mean	S.D	Score	Interpretation
Q5: The comparison between Daendels' land-rent system dan Van den bosch's enforcement planting	101	1,00	5,00	3,28	0,80		Moderate
Q6: Perbandingan masa orde baru dan orde lama	101	2,00	5,00	3,40	0,75		High
Q7: The motives behind DI/TII rebellion and its solution	101	2,00	5,00	3,33	0,75		Moderate
Q8: The motives behind revolution of 1998 and its solution	101	1,00	5,00	3,34	0,72		Moderate
T1: knowledge of local heroes	101	1,00	12,50	10,96	3,72	87,68	Satisfactory
T2: Knowledge of founding fathers of Islamic kingdom	101	1,00	12,50	9,32	4,73	74,56	Satisfactory
T3: Factors to the arrival of Islam in Indonesia	101	1,00	12,50	6,78	4,26	54,24	Unsatisfactory
T4: World's civilization	101	2,00	12,50	8,14	4,69	65,12	Unsatisfactory
T5: Comparison on the politics of colonization era	101	1,00	12,50	8,23	4,75	65,60	Unsatisfactory
T6: Comparison of world's paramount ideology	100	1,00	12,50	7,99	4,39	63,92	Unsatisfactory
T7: The motives behind PKI rebellion in Madiun and its solution	101	1,00	12,50	8,23	4,69	65,84	Unsatisfactory
T8: The motives behind guided democracy in Indonesia and its solution	101	1,00	12,50	7,72	4,82	61,76	Unsatisfactory

The table above shows that the mean of overall students' prior knowledge is  $M = 3.50$   $SD = 0.47$ , demonstrating high level. To contrast, students' test scores are found at  $M = 8.42$   $SD = 2.59$  with a score of 67.36. This indicates that the average students do not meet the minimum passing criteria (score of prior knowledge test =  $67.36 < 75$ ). The student's score is calculated using the following formula.

$$\text{Score} = \frac{\text{Achieved score}}{\text{Maximum score}} \times 100$$

eg.

$$\text{Score} = \frac{8,42}{12,5} \times 100 = 67,36 \text{ (score} < 75: \text{ minimum criteria not achieved)}$$

Students' prior knowledge is mostly laden with factual knowledge, which is the lowest level of knowledge. Students begin to struggle when they are confronted with questions requiring higher level of knowledge. Based on the tests, students mostly fail to meet the achievement criteria in knowledge of meaning, integration of knowledge, and application of knowledge. The following data points out mean scores of their prior knowledge based on gender, age level and type of school.

**Tabel 5.** Comparison on Students' Prior Knowledge

Variable	Indicators	Questionnaire	Test
Male	Mean	3,45	7,78
	Std. Deviation	0,55	2,79

Variable	Indicators	Questionnaire	Test
Female	Mean	3,52	8,82
	Std. Deviation	0,40	2,40
17 years	Mean	3,68	8,71
	Std. Deviation	0,68	3,88
18 years	Mean	3,44	8,57
	Std. Deviation	0,43	2,30
19 years	Mean	3,57	8,30
	Std. Deviation	0,49	2,77
Over 20 years	Mean	3,20	6,50
	Std. Deviation	0,56	4,55
Private-owned school	Mean	3,50	7,74
	Std. Deviation	0,55	2,81
<i>Madrasah Aliyah</i>	Mean	3,61	8,36
	Std. Deviation	0,53	1,44
Vocational high school	Mean	3,59	8,46
	Std. Deviation	0,57	3,80
Public high school	Mean	3,46	8,51
	Std. Deviation	0,44	2,60

The table above shows that women ( $M = 3.45$ ;  $SD = 0.55$ ) have higher prior knowledge compared to men ( $M = 3.45$ ;  $SD = 0.40$ ), which is also indicative of the test scores. This shows that women acquire richer knowledge and apply more complex cognitive structures. With regard to age, the data shows that students aged 20 years and over have the lowest prior knowledge as indicated by questionnaire and test scores, compared to other age groups. Apparently, causal relationship is evident because students at the age of 20 and above do not directly graduate from higher education. They have an extended period of rest and a waiting period of around 1 to 2 years after they graduate in high school. This has resulted in a decrease in retained knowledge they had acquired since senior high school. Students' activities and preoccupations such as work have made the cognitive structure decline, which is why they only remember very few details from History lesson in the previous educations. Our interpretation on Table 5 shows that the students' prior knowledge based on the type of school, as evinced by test results, shows that students attending public high schools have higher prior knowledge levels compared to those graduating from other types of schooling. This is due to the facilities and learning quality at public schools to support the optimization of students' knowledge development. The lowest level of prior knowledge is indicated among those graduating from private schools. This implies that every school is responsible for identifying students' learning difficulties and embarks on innovating instructional methods for improved knowledge acquisition.

#### 4. Conclusions

This study aims to identify the level of students' prior knowledge in higher education setting. The study involved 101 freshmen in the Department of History Education. The results showed that the level of students' prior knowledge is commonly ranked at a high level, as corroborated by data from valid questionnaire and test. Test results show that the average student has low prior knowledge. This is proven by the failure to achieve the minimum passing score specified as the benchmark for measuring students' prior knowledge. This espouses that the prior knowledge is still limited to factual knowledge. Higher education needs to innovate learning approach to explore and excel students' prior knowledge.

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## References

- [1] Gijlers H & Jong T 2005 The Relation between Prior Knowledge and Students' Collaborative Discovery Learning Processes **42** 264–282 <https://doi.org/10.1002/tea.20056>
- [2] Hailikari, T Katajavuori N & Lindblom-ylanne S 2008 The Relevance of Prior Knowledge in Learning and Instructional Design **72** 1–8.
- [3] Gloger-frey I, Deutscher M. & Renkl A 2018 Student teachers' prior knowledge as prerequisite to learn how to assess pupils' learning strategies *Teaching and Teacher Education* 1–15. <https://doi.org/10.1016/j.tate.2018.01.012>
- [4] Hailikari T, Nevgi A, Lindblom-Yla`nne S Exploring alternative ways of assessing prior knowledge, its components and their relation to student achievement: a mathematics-based case study. *Stud Educ Eval.* 2007;33:320-37.
- [5] Ell F, Hill M & Grudnoff L 2012 Finding out more about teacher candidates' prior knowledge: Implications for teacher educators *Asia-Pacific Journal of Teacher Education* **40** <https://doi.org/10.1080/1359866X.2011.643760>.
- [6] Askill-Williams H, Lawson M J, & Skrzypiec G 2012 Scaffolding cognitive and metacognitive strategy instruction in regular class lessons *Instructional Science* **40** 413e443. <https://doi.org/10.1007/s11251-011-9182-5>.
- [7] Tobias S 1994 Interest, Prior Knowledge, and Learning **64** 37–54.
- [8] Wood S L, Lynch, J G, Wood S L, & Lynch J G 2015 Prior Knowledge Complacency in New Product Learning **29** 416–426.
- [9] Stacy L Wood & John G Lynch JR 2002 Prior Knowledge and Complacency in New Product Learning *Journal of Consumer Research* **29**.
- [10] Hosein, A & Harle J 2018 The relationship between students' prior mathematical attainment, knowledge and confidence on their self-assessment accuracy *Studies in Educational Evaluation* **56** 32–41. <https://doi.org/10.1016/j.stueduc.2017.10.008>
- [11] Zambrano R. J, Kirschner F, Sweller J & Kirschner P A 2019 Effects of prior knowledge on collaborative and individual learning. *Learning and Instruction*, **63** 101214. <https://doi.org/10.1016/j.learninstruc.2019.05.011>
- [12] Schmidt H K, Rothgangel M, & Grube D 2017 Does prior domain-specific content knowledge influence students' recall of arguments surrounding interdisciplinary topics? *Journal of Adolescence* **61** 96–106. <https://doi.org/10.1016/j.adolescence.2017.10.001>
- [13] Demirel M & Coşkun Y D 2010 A study on the assesment of undergraduate students' learning preference. *Procedia Social and Behavioral Sciences* **2** 4429–4435. <https://doi.org/10.1016/j.sbspro.2010.03.706>
- [14] Chesky J & Hiebert E H 2016 The Effects of Prior Knowledge and Audience on High School Students' Writing. *The Journal of Educational Research.* <https://doi.org/10.1080/00220671.1987.10885772>
- [15] Kirschner F, Sweller, J & Kirschner P A 2019 Effects of prior knowledge on collaborative and individual learning. *Learning and Instruction* **63** 1–8.
- [16] Cogliano M C, Kardash C A M & Bernacki M L 2018 The Effects of Retrieval Practice and Prior Topic Knowledge on Test Performance and Confidence Judgments. *Contemporary Educational Psychology* <https://doi.org/10.1016/j.cedpsych.2018.12.001>
- [17] Reiff M & Bawarshi A 2011 Tracing discursive resources: How students use prior genre knowledge to negotiate new writing contexts in first-year composition. *Written Communication*, **28** 312-337. Doi:10.1177/074/088311410183.
- [18] Shapiro A 2004 How including prior knowledge as a subject variable may change outcomes of learning research. *American Educational Research Journal*, **41** 159-189.
- [19] Soiferman L K 2012 “University and high school are just very different” Student perceptions of their respective writing environments in high school and first-year university. (Unpublished doctoral dissertation). University of Manitoba, Winnipeg, MB.
- [20] Abdelaal NM and Sase AS 2014 Relationship between Prior Knowledge and Reading Comprehension. *Advances in language and literary studies.* <http://dx.doi.org/10.7575/aiac.all.v.5n.6p.125>

- [21] Wetzels, Kester L, Merri Van & Broers N J 2011 The influence of prior knowledge on the retrieval-directed function of note taking in prior knowledge activation 274–291. <https://doi.org/10.1348/000709910X517425>
- [22] Sugiyono 2006 Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: CV Alfabeta, 0. 520. Statistika untuk penelitian. DR Sugiyono. Bandung: CV. Alfabeta, Puji RPN and Umamah N 2018
- [23] Edmodo Multimedia: Supporting Technology for Media Learning at Higher Education International. Journal of English. Literature and Social. Sciences 3 2456 <https://dx.doi.org/10.22161/ijels.3.1.9>
- [24] Puji RPN and Ahmad AR 2015 Gaya Belajar dan Kemahiran Pemikiran Sejarah Dalam Pembelajaran Sejarah di Peringkat Universitas Edusentris, Jurnal Ilmu Pendidikan dan Pengajaran, **2** 253
- [25] Puji RPN and Ahmad AR 2015 Learning Style of MBTI Personality Types in History Learning at Higher Education Scientific Journal of PPI-UKM **3** 289
- [26] Priskilla M et al 2018 Interactive Multimedia Based on Computer Assisted Instruction: Development Efforts on the Learning Interest and Effectiveness in the History Learning International Journal of Humanities and Social Science **5** 43 <http://www.internationaljournalsrsg.org>
- [27] Rismayati F A et al 2017 Reyog Ponorogo National Festival as the Cultural Conservation Efforts and Character Education for the Younger Generation The International Journal of Social Sciences and Humanities Invention **4** 3768 DOI: 10.18535/ijsshi/v4i8.12
- [28] Puji RPN et al 2019 Historical geography: the analysis of geographic condition of Egyptian and Chinese civilizations IOP Conf Series: Earth And Environmental Science **243** 012157 doi:10.1088/1755-1315/243/1/012157
- [29] Puji RPN and Sumarno 2018 Plastic waste product development: environment preservation efforts IOP Conf Series: Earth And Environmental Science **243** 012149 doi:10.1088/1755-1315/243/1/012149
- [30] Puji RPN et al 2018 The Production of Key Chain Kaugaci (Keychain Cardboard) as a Development Effort of Psychomotor Skills in Higher Education International Journal of Scientific Research and Management **6** 97 DOI: 10.18535/ijssrm/v6i3.e101
- [31] Puji RPN et al 2018 Increasing Multi-Business Awareness through “Prol Papaya” Innovation International Journal of Humanities Social Sciences and Education **5** 55 <http://dx.doi.org/10.20431/2349-0381.0501009>
- [32] Puji RPN et al 2018 The Innovation of Basa Sardine Sticks to Optimize Social Economic on Puger Society International Journal of English Literature and Social Sciences (IJELS) **3** 7 <https://dx.doi.org/10.22161/ijels.3.1.2>