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Junior high school student perception of online learning in pandemic Covid-19: Gender, social media ownership, and internet access duration perspective

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ABSTRACT

This study aims to explore students' perceptions of the implementation of online learning during the pandemic in terms of gender perspective, ownership of social media, and duration of internet access. This research was conducted by a survey involving 87 students (P = 51% and L = 49%) in junior high school. Data were analyzed using Logit Value of Item (LVI) and Wright map combined with Logit Value of Person (LVP). Students' perceptions were reviewed based on gender, social media ownership, and duration of daily internet access. The results showed that, in general, students have a positive perception of online learning. Based on gender, male and female students have almost the same positive perception of online learning. In terms of ownership of social media accounts, students with one account or two social media accounts have a perception of online learning above the average logit person. Most students who access the internet for more than 5 hours have a perception above the average logit person. Students whose internet access duration is 3-4 hours have a perception above the average logit person. So, gender, social media ownership, and internet access duration of 3-4 hours have positive perceptions of online learning.

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1. Introduction

Since the Covid-19 pandemic, teaching and learning have been conducted online from home for every level of education, including secondary school students [1]. Various online media have been used to support the learning shift either synchronously, asynchronously, or a combination of both [2], [3]. Support for online learning strategies is also an important component in reducing the impact of the pandemic on the learning process [4]. However, this rapid change can cause students not to be fully prepared for online-based learning [5]. Therefore, analyzing student perceptions in online learning will help teachers and stakeholders determine the next policy. Online learning strategies can also be adjusted by knowing the personalization. Students' perception of online learning is an important issue in online learning. A research definition that the students' perception is the expansion of attitude toward online learning [6]. This perception leads to factors of perceived advantages and disadvantages during internet-based learning [7], [8]. Student perceptions during online learning are correlated with infrastructure support, peers, and technicians [9]. A positive perception in online learning will lead to success in the integration and process [10]. Other studies have shown that this strategy is a burden on students and even parents [11]. Therefore, it requires to complete it. This case is not only because of the strategy. Many other factors can affect students' enthusiasm for learning during a pandemic, including facilities and encouragement of learning needs [12]. The facilities here

include devices used for online learning and the internet [13], and the internet in Indonesia is still not evenly distributed [14].

In the past decade, several studies have been conducted to explore students' perceptions of online learning [7], [15]–[17]. Students' perceptions of e-learning have been predicted on specific factors, age, gender, computer experience, acceptance, and student learning styles [17]. Then, Wan et al. [16] modeled the effectiveness and convenience of online learning, which is directly influenced by virtual competence as a latent variable and information seeking and communication as an observed variable. This indicates there is a shift in perception regarding the technology used. Meanwhile, recent research shows that the effectiveness of online learning depends on learning content, infrastructure, competence, readiness, and follow-up [18]. This perception differs based on age, student experience [19], flexibility, and learning methods [20]. However, students' perceptions of social media use and duration of access are rarely explored in depth. In fact, many teachers give instructions on social media for online learning [21], [22]. In addition, the duration of access may provide a positive or negative impression on learning, even though it affects learning effectiveness [23]. This condition is of particular concern because the education lag will be high [24], [25]. Despite the several effects of the COVID-19 pandemic on the learning process, students' readiness to participate in online learning remains a concern.

Previous research has shown that in online learning, students must quickly adapt to move from teaching in real classrooms to virtual classrooms [26], [27]. Students might lose their motivation to learn and obstacles in the procurement of internet devices and signals, which many students experience. Online learning has two approaches, asynchronous and synchronous, which will provide new potential in learning [28]. Both have their advantages and disadvantages. In the current pandemic, it is appropriate not to lean towards one of these learning methods, but the combination of the two will provide new potential in learning. Recent research shows that many have researched the topic of online learning, for example, developing android-based learning tools [29], *Learning Management System* (LMS) [30], and e-module [31]. Other studies have also reported an impact on student learning outcomes from using these online learning tools [32]–[34]. However, there is still limited literature that examines students' perceptions of the implementation of online learning so far. Therefore, this study aims to evaluate students' perceptions of online learning during the pandemic based on gender, social media ownership, and duration of internet access perspective.

2. Method

This research is included in survey research involving 87 students (P = 51% and L = 49%) in grade 7 in a junior high school, Yogyakarta. Students from 3 classes were selected using the cluster random sampling technique. The age of students is in the range of 12 to 14 years. The mean age of the students is 12.6 years, and the standard deviation is 0.5 years. The students involved were students who had carried out online learning using Quizizz, YouTube, and Google Meet during the covid-19 pandemic. We also collect student demographic information such as gender and age. As shown in Table 1, 97.7% of students own a smartphone. As many as 90.8% of them have an account on Instagram social media, and only 40.2% have a Facebook account. If we look at the duration of daily internet access, 81.6% of students access the internet for at least 3 hours every day. Students' perceptions of online learning were administered using the POSTOL instrument developed by Bhagat [35]. POSTOL consists of 16 items spread over four factors and validated using factor analysis techniques (EFA and CFA).

The four factors in POSTOL include Instructor characteristics (KP, 5 items), Social presence (KS, 5 items), Instructional design (DI, 3 items), and Trust (K, 3 items). Student perceptions of online learning were administered using a 5-point Likert scale, from 1 (Strongly Disagree) to 5 (Strongly Agree). Items that have been adapted are then formatted in a Google online survey. Instruments are distributed to respondents through the WhatsApp group. However, student participation is anonymous. Data collection was carried out in about two weeks. Data analysis was performed using Excel and Winsteps 4.6.1 [36]. Excel is used for coding and data preparation. Winsteps is used to analyze students' perceptions based on item response theory. The difficulty level of items was identified using the Logit Value of Item (LVI). Students' perceptions of online learning were analyzed based on the Wright map combined with the Logit Value of Person (LVP).

Table 1. Demographic Statistics

Demographics (Code)		N	%
Gender	Female (P)	44	50.6
	Male (L)	43	49.4
Smartphone Ownership	Yes (S)	85	97.7
	No (T)	2	2.3
Facebook account ownership	Yes (F)	35	40.2
	No (G)	52	59.8
Instagram account ownership	Yes (I)	79	90.8
	No (J)	8	9.2
Daily internet access duration.	> 5 hours (4)	32	36.8
	3-4 hours (3)	39	44.8
	1-2 hours (2)	14	16.1
	< 1 hours (1)	2	2.3
Age (Years)	Maximum	14	
	Minimum	12	
	Average	12.6	
	Standard deviation	0.5	

The criteria for grouping the difficulty level of items refer to Table 2. Students' perceptions of online learning are reviewed based on gender, social media ownership, and duration of daily internet access.

Table 2. Item Difficulty Criteria [37]

Logit range of values	Criteria
LVI ≥ M + SD	Very difficult
M ≤ LVI < M + SD	Difficult
M – SD ≤ LVI < M	Easy
LVI < M – SD	Very easy

3. Results and Discussion

3.1. Summary Statistics

Table 3 summarizes the statistics on student perceptions of online learning that has been carried out. Based on Table 3, the item and person reliability values are 0.97 and 0.74, respectively. While the instrument reliability value, indicated by Cronbach's coefficient, is 0.78. The item and person strata indexes are 7.91 and 2.56, respectively. The logit item size ranges from -1.89 (DI3) to 1.54 (K3), and the person logit size ranges from -0.01 (08PSGI3) and 6.02 (51LSFI3). Judging from the average logit, the person has a logit of 1.63 with a standard deviation of 1.03. At the same time, the items have an average logit of 0.00 with a standard deviation of 1.00. Based on the reliability value, the POSTOL instrument has a good consistency. Item and person reliability shows the quality of the items in the very good category and the consistency of students' answers in the good category. In comparison, Cronbach's value indicates the interaction between person and items as a whole in the good category [38], [39].

Table 3. Summary of statistics on student perceptions of online learning

Demographics (code)		N	%
Measure	Minimum	-1.89 (DI3)	-0.01 (08PSGI3)
	Mean	0.00	1.63
	SD	1.00	1.03
	Maximum	1.54 (K3)	6.02 (51LSFI3)
Strata		7.91	2.56
Reliability		0.97	0.74
Cronbach's α		0.78	

3.2. Item difficulty distribution

The difficulty level of each item is grouped by Logit Value of Item (LVI). Grouping is carried out on each component which can be seen in Table 4. In Table 4, the 16 items are grouped into four levels of difficulty using the mean and standard deviation of the logit items, very easy (LVI < -1.00), easy (-1.00 ≤ LVI < 0.00), difficult (0.00 ≤ LVI < 1.00), and very difficult (LVI ≥ 1.00) [40], [41]. There are 25% items (4 of 16 items) that are very easy. 12.5% of items (2 out of 16 items) are included in the

easy category. Seven of the 16 items (43.8%) are in the difficult category. While 18.8% (3 of 16 items) are included in the very difficult category.

Table 4. Item difficulty level in POSTOL

Component	Difficulty Level			
	Very Easy	***Easy***	***Difficult***	***Very Difficult***
Instructor characteristics	KP1, KP3, KP5	KP2, KP4		
Social presence			KS1, KS2, KS3, KS4	KS5
Instructional design	DI3		DI1, DI2	
Trust			K1	K2, K3

Based on the components, 60% of items (3 out of 5 items) at Instructor characteristics are distributed in the very easy category, and 40% of items (2 out of 5 items) are distributed in the easy category. In the Social presence, 4 out of 5 items (80%) are distributed in the difficult category, and one other item is distributed in the very difficult category. The same applies to items in the Trust that are spread out in the difficult and very difficult categories. Two of the three items (67%) are in the very difficult category, and 33% are in the difficult category. Meanwhile, the items in the Instructional Design component are divided into very easy and difficult categories. As many as 33% (1 of 3 items) are in the very easy category, and 67% are in the difficult category.

3.3. Wright map Student Perception of Online Learning

In this section, we describe students' perceptions of online learning based on the Wright map. The Wright map is divided into four quadrants [42]. Quadrant 1 (right-top side) maps students with a high perception of online learning (it is easier to agree with various statements given). Quadrant 2 (left-upper side) is used to map items with a high difficulty level (a statement that respondents do not easily agree with). Quadrant 3 (bottom-left side) maps items with a low difficulty level (statements are easier for respondents to agree with). Quadrant 4 (bottom-right side) is used to map students who have low perceptions of online learning (it is more difficult to agree with various statements given). In the first part, we review in general, and then specifically, we review by gender, social media ownership, and duration of daily internet access. The Wright map is one of the visualizations used to explain how the interaction between the level of student's perceptions of the level of difficulty of the items used to see their perceptions The relationship between person and item as a whole can be seen in Figure 1. Based on Figure 1, it appears that the average ability of students is higher than the average level of item difficulty. This shows that the average student has a good perception of online learning [43]. Students with code 51LSF have the highest perception among other students.

Meanwhile, students with the lowest perception were owned by students with the code 08PSG. The most difficult item for students to agree on was K3 "I study harder in online learning than offline." The easiest item for students to agree on was DI3 "Understanding the subject matter is very important to me." For 51LSF students, all items have a more than 50% chance of being approved because the logit value is higher than the logit of all items. As for 08PSG students, even though she is at the lowest level of perception, she still has a more than 50% chance of agreeing to 6 items (KP1, KP2, KP3, KP4, KP5, and DI3). At the same time, ten items (K1, K2, K3, DI1, DI2, KS1, KS2, KS3, KS4, and KS5) have less than a 50% chance of being approved by 08PSG. This is because the 08PSG logit is lower than the 10-item logit. Most of the students' abilities were distributed at moderate, high, and very high levels. When viewed more closely, 17% of students have a very high level of perception. As many as 23% of them have a high level of perception. At the same time, 52% of students have a moderate level of perception. Only a small number of students have low perceptions of online learning. Although the K3 item is the most visually difficult in Figure 1, students with high and very high levels of perception have a more than 50% chance of agreeing to K3 because the logit person value is the high and very high category is higher than the logit value K3. On the other hand, for students with moderate and low levels of perception, the probability of K3 items being approved is less than 50% because the K3 logit value is higher than the student logit in the moderate and low groups. In contrast to Item DI3 as the easiest item, this item has a more than 50% chance of approval by all respondents. This is because the logit value of DI3 is below the logit value of all students.

Student learning activities during the pandemic still need to be trained and made adjustments. So far, offline learning is still comfortable for students. It is not easy for students to suddenly change their perspective on offline learning that they have been carrying out so far [44]. However, seeing the development of the current pandemic requires educators to prepare independent learning strategies

that can optimize student activities so that they are more active in learning online [45]. On the other hand, students realize the importance of understanding the material during online learning.

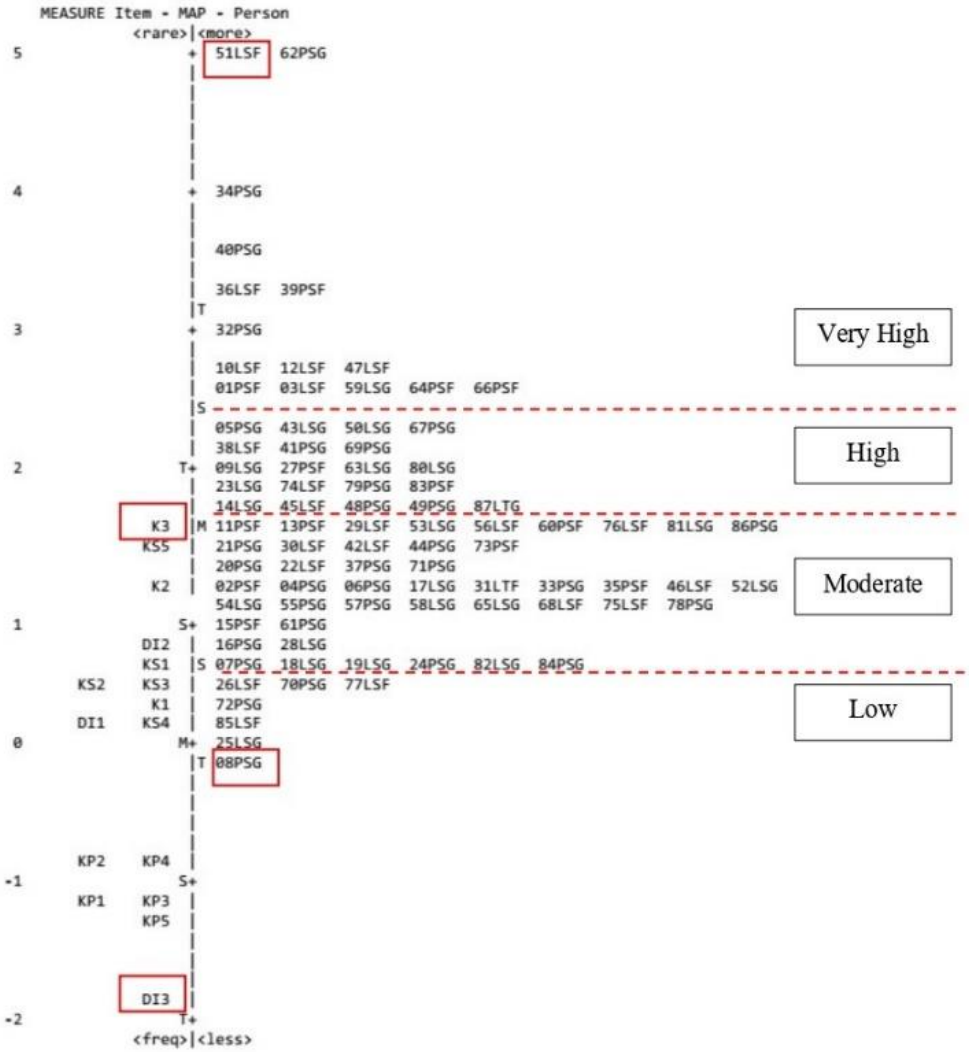

Fig. 1. Interaction between student ability and item difficulty level in general

3.4. Person-item interaction based on gender.

The relationship between a person and items based on gender can be seen in Figure 2. Figure 2 shows that most male and female respondents (35 of 87 people, 40%) perceive online learning above the average logit person. Looking closely, 42% (18 of 43 people) of male respondents have a logit above the average logit person. Meanwhile, female respondents, amounting to 39% (17 out of 44 people), have a logit above the average logit person. This shows that male and female students have almost the same perception of the online learning used. By gender, only 18 out of 43 (42%) men had a greater than 50% chance of agreeing to all statements. As for female students, only 17 out of 44 people (39%) have a more than 50% chance of agreeing to all the statements. This is because the logit is above the logit of all existing items [46]. Furthermore, we see, the K3 item "I study harder in online learning than when offline" has a more than 50% chance of being approved by 54% of men (23 of 43 students) and 46% of women (20 of 44 students) having a chance agree more than 50%. This shows that both male and female students are ready to use technology-based learning. This is linear with the findings of several previous studies regarding students' readiness as digital natives in using electronic-based learning [47], [48]. On the other hand, the DI3 item "Understanding the subject matter is essential to me" has a more than 50% chance of being approved by all male and female students. This is evidenced by the DI3 item's position on the map, which is lower than the location of all male and female students. However, the DI3 item appears to be easier for either gender because it has a probability of less than 5% (see Figure 3) [49].

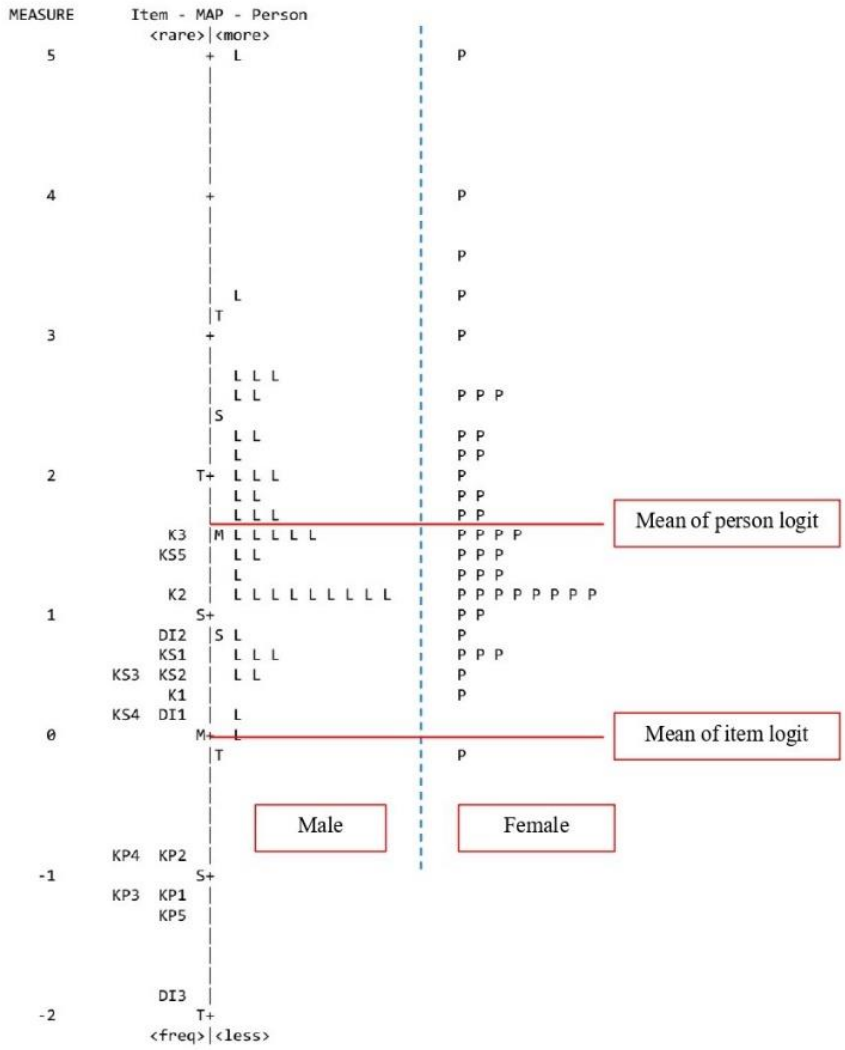

Fig. 2. Interaction between student ability and item difficulty level by gender

Based on Figure 3, it appears that the DI3 item "Understanding the subject matter is very important to me" is easier or more profitable for females than males. At the same time, the other 15 items have relatively the same tendency towards both genders.

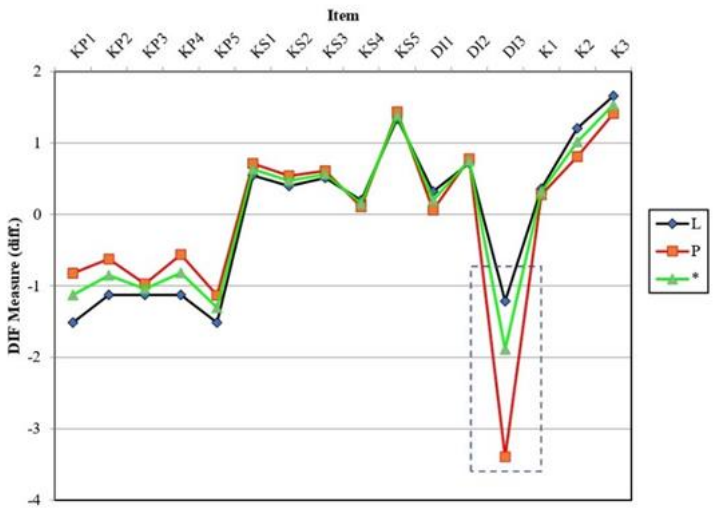

Fig. 3. Differential Item Functioning in POSTOL by gender.

3.5. Person-item interactions based on Social Media ownership.

The relationship between person and item based on social media ownership is shown in Figure 4. In Figure 4, students' perception levels are grouped based on social media account ownership. The social media accounts used are Facebook and Instagram. The coding of account ownership refers to Table 1. The FI code indicates that the student has two social media accounts, and the GJ code indicates that the student does not have both. The other code indicates the ownership of one social media account. Based on the ownership of social media accounts, only 35 out of 87 students (40%) had a perception logit above the average logit item. In more detail, we can see that 14 out of 32 (44%) students with two social media accounts have a logit perception of online learning above the average logit item. Nineteen out of 50 students (38%) with one social media account had logit scores above the average logit item. In comparison, students who do not have social media accounts have logit values above the average logit item.

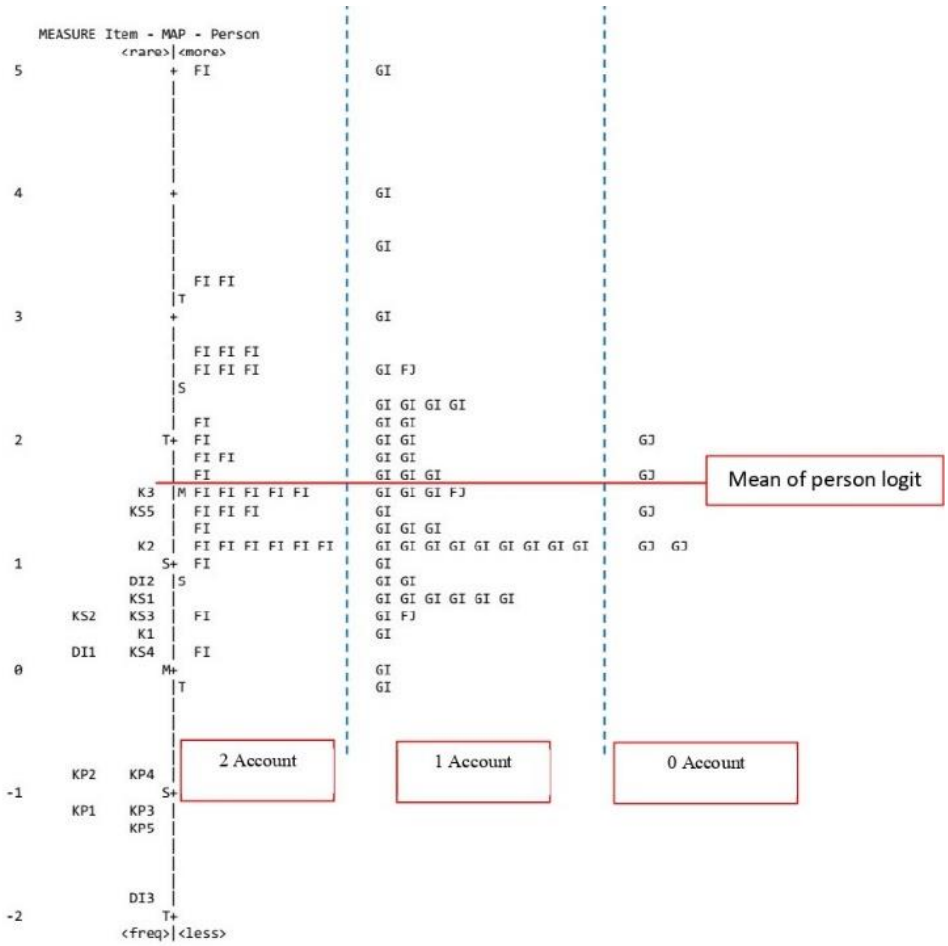

Fig. 4. Interaction between student ability and item difficulty level based on social media ownership

As many as 17 out of 32 (53%) students who have two social media accounts have a more than 50% chance of agreeing to all the statements. At the same time, 23 out of 50 students (64%) with one social media account have a more than 50% chance of agreeing to all the statements given. Only a small percentage of students without social media has a more than 50% chance of agreeing to all statements [46]. More specifically, most students positively perceived the KS2 item "For me, sharing knowledge through online discussion is a good idea." 94% of students with two social media accounts use online discussions as a vehicle to share knowledge. Ninety-four percent of students with one social media account also agreed to do the same. On the other hand, having a social media account does not become a barrier for students who do not have an account to share knowledge through discussion during online learning.

3.6. Person-item interactions based on internet access duration.

The interaction relationship between person and item based on the duration of internet use is shown in Figure 5. In Figure 5, the respondents' perception level is grouped based on the duration of daily internet access. The coding of internet access duration refers to Table 1. Based on Figure 5, it appears that students' perceptions of online learning based on the duration of internet access are still not evenly distributed. This is indicated by the number of students who have a logit value below the average logit person of 60%. As many as 44% (14 out of 32 students) of students who access the internet more than five hours a day have logit scores below the average. Likewise, for students who access the internet 3-4 hours a day, only about 36% (14 out of 39 people) have a perception logit above the average logit person. Meanwhile, students who access the internet for less than 2 hours have an above-average perception of no more than 44%.

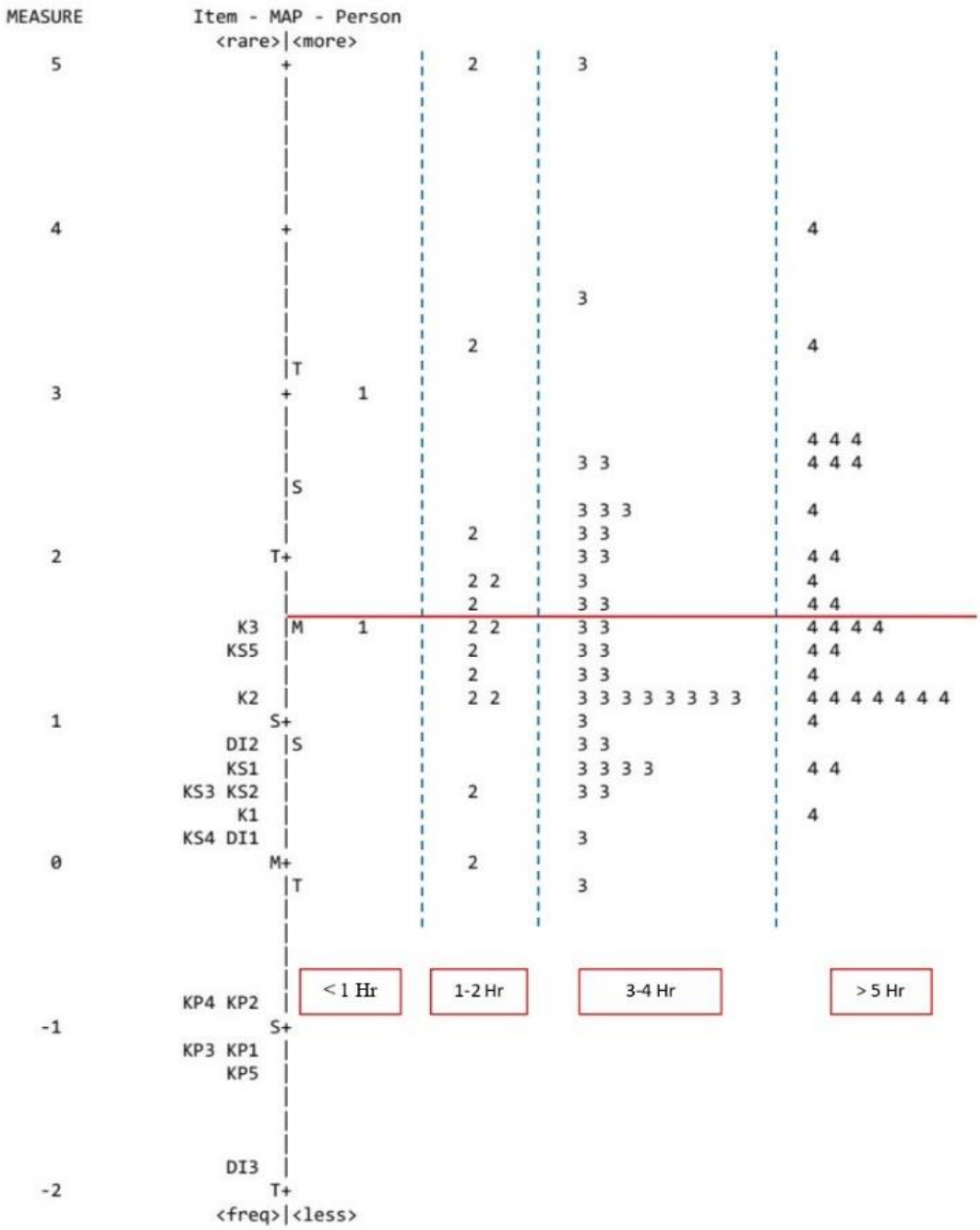

Fig. 5. Interaction between student ability and item difficulty level based on the duration of internet use

Based on the duration of internet access, 17 out of 32 students (53%) who accessed the internet more than 5 hours had a more than 50% chance of agreeing to the various items given. Meanwhile, in the group of students who accessed the internet for 3-4 hours, only 41% had a more than 50% chance of agreeing to all statements. Meanwhile, in the internet access group of fewer than 2 hours, the percentage of students who had the opportunity to agree with various statements was 56%. More specifically, most students positively perceive item K1, "Online learning should provide a better learning experience than offline learning." 97% of students who access the internet for more than five hours have logit scores higher than logit K1. The students who access the internet daily for 3-4 hours have a higher logit than item K1.

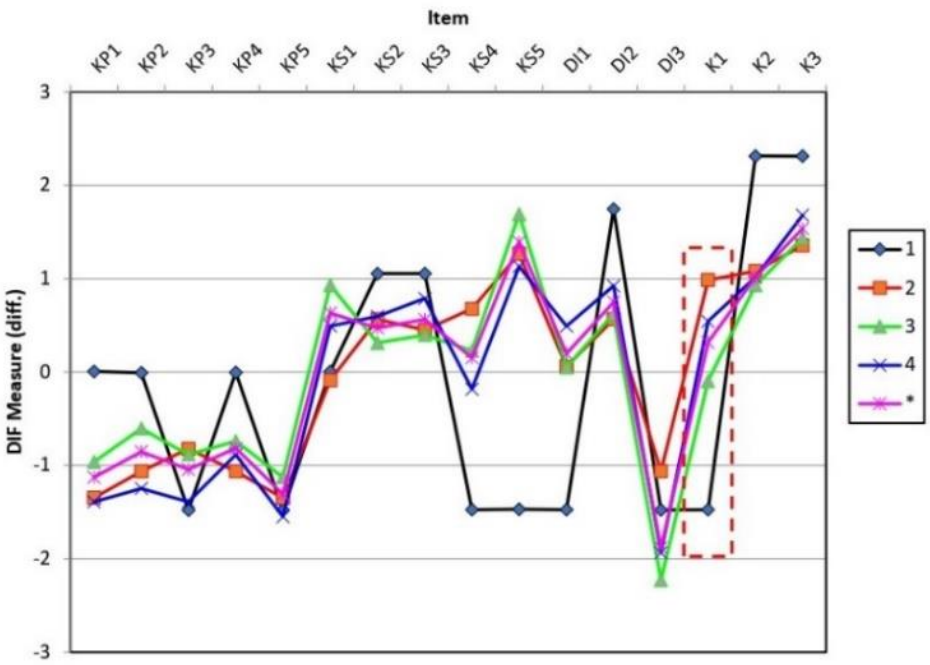

Fig. 6. Differential Item Functioning in POSTOL based on internet usage duration

The same thing happened to students who accessed the internet for less than 2 hours, and the logit value was higher than logit K1. This indicates that they have a more than 50% chance of agreeing to the statement in K1. In other words, almost all students expect a better learning experience than the learning experience they got in the pre-Covid-19 period. Although most of the students in each group had almost the same percentage of K1 items, the results of the Differential Item Functioning analysis showed a tendency to be more difficult for students who access the internet 1-2 hours per day. This is shown in Figure 6.

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Additional information	:	No additional information is available for this paper.

4. Conclusion

Online learning has become a daily activity for students in Indonesia for approximately two years since the Covid-19 pandemic began. During this time, students have never had face-to-face learning. Based on the research that has been done, it can be concluded that, in general, the average logit of students' perceptions is higher than the average level of item difficulty. This indicates that students have a positive perception of the online learning that is carried out. Based on gender, 58% of male respondents and 61% of female respondents have a perception below the average logit person. Regarding ownership of social media accounts, 44% of students with two accounts and 38% of students with one account have a logit perception of online learning above the average logit person. Meanwhile, based on daily internet access, 56% of students who access the internet for more than 5 hours have a perception above the average logit person. The same thing happened to students who accessed the internet for 3-4 hours and less than 2 hours a day, each of which had above-average perceptions of 36% and 44%. This study was limited to junior high school students. However, this research has significantly described how students perceive the implementation of online learning during the pandemic. Therefore, future research can review how online learning is accepted by high school or vocational high school students. Even other researchers can expand the area of study at the elementary school level.

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