# EXPLORATION OF PHYSICS CONCEPTS IN TOURISM SITES FOR BASIC COMPETENCY OF GRADE 12

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**Abstract**

This study aims to determine the relationship between the rides in Jatim Park 3 with the basic competence (BC) of high school physics grade 12 and visitors' response to these rides. This study used a qualitative-quantitative design (Mixed Method) with a sequential exploratory mixed-method approach. The subjects used in this study were the visitors to Jawa Timur Park 3 who visited the infinity world rides and fun tech. The data from the relationship between BC and physics instruments were obtained from interviews with managers whose results were analyzed using qualitative descriptive and responses were obtained using a visitor response questionnaire, the results of which were analyzed using exploratory factor analysis. Based on the qualitative descriptive analysis, the results of the interviews conducted by Jatim Park 3 can be used as a means of study tours for grade 11 and 12. Based on the analysis of the exploratory factors in the visitor response questionnaire, it was found that the calculated KMO value is 0.845, and the p-value is 0.000 (<0.05), and it can be said that the data can be used. Most visitors did not understand the basic concepts of physics on the infinity world and fun tech rides and that visitors were enthusiastic about the study tour activities at Jatim Park 3.

**Keywords**: Physics concept, tourism object, basic competence, visitor response

**Abstrak**

Penelitian ini bertujuan untuk mengetahui keterkaitan antara wahana di Jatim Park 3 dengan Kompetensi Dasar Fisika SMA kelas XII dan respons dari pengunjung terhadap wahana tersebut. Penelitian ini menggunakan desain kualitatif-kuantitatif (*Mixed Method*) dengan pendekatan metode campuran sekuensial eksploratori. Subjek yang digunakan dalam penelitian ini adalah para pengunjung Jawa Timur Park 3 yang mengunjungi wahana *infinity world* dan *fun tech*. Hasil data dari keterkaitan Kompetensi Dasar (KD) dan wahana fisika diperoleh dari wawancara terhadap pengelola yang hasilnya dianalisis menggunakan deskriptif kualitatif dan respon diperoleh menggunakan angket respon pengunjung yang hasilnya akan dianalisis menggunakan analisis eksplorasi faktor. Berdasarkan analisis deskriptif kualitatif pada hasil wawancara yang dilakukan Jatim Park 3 bisa digunakan sebagai sarana untuk *study tour* kelas XI dan XII. Berdasarkan analisis ekplorasi faktor pada angket respon pengunjung didapatkan nilai KMO yang terhitung sebesar 0,845 serta *p-value* sebesar 0,000 (< 0,05) dan dapat dikatakan bahwa data dapat digunakan. Sebagian besar pengunjung kurang paham dengana konsep dasar fisika pada wahana *infinity world* dan *fun tech* dan pengunjung antusias atas kegiatan *study tour* di Jatim Park 3.

***Kata kunci:*** *Konsep fisika, obyek wisata, kompetensi dasar, respon pengunjung*

## Introduction

Physics learning in schools so far tends to be dominated by teachers; students only accept the teacher's knowledge without any potential processing that students have. Following what Tjia (2000) said, physics teaching in Junior High School and Senior High School only emphasizes one process of understanding natural phenomena, namely the deductive process. This way of teaching can indeed make children more critical and analytical of natural phenomena taught, but the side effect can kill children's creativity in finding facts from phenomena.

It was complicated to be able to generate its hypothesis or a simple theoretical model. It is not under the Law of the Republic of Indonesia on education. Based on the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System article 3 states that "the purpose of education is to

develop the potential of students to become human beings who believe and fear God Almighty, have a noble character, are healthy, knowledgeable, capable, creative, be independent and become democratic and responsible citizens".

Learning is a process of interaction between students and educators and learning resources in a learning environment (Gagne, 1996). Learning can be done both inside and outside the classroom.

Participatory Action Research (PAR) is research that actively involves all relevant parties (stakeholders) in assessing ongoing actions (where their own experiences are a problem) in order to make changes and improvements for the better (Afandi, 2013). Therefore, the participatory action research method is considered very suitable for conducting research related to the community. Here prospective teachers or students act as co-researchers, which means they can observe and learn from observational research.

Place-Based Education is a part of Education whose learning is based on learning experiences. It is inseparable from Sterling (2003) who argues that place-based Education has a background in authentic Education which always comes from a place and tradition. Place-Based Education (PBE) or place-based learning is usually carried out in areas containing many science elements. Some places include forests, mountains, places that have high seismic activity, and tourism objects.

In 2015-2019 the government started the 100 technopark program, where the government built 100 technoparks in several regions in Indonesia and has three functions, namely education and training, research and research, and business development (Noor Arifin, 2017; Suprapto, Adam, Suliyanah, Sunarti, & Mubarok, 2019).

From the description described, the researcher uses technopark in conducting outdoor learning to find out how the suitability between technopark and the material taught in learning through combined research analysis as a basis for research.

## RESEARCH METHODS

### 1. Qualitative Descriptive Analysis

Qualitative descriptive analysis was conducted to analyze the relationship between the concepts in the physics spots and BC of grade 12.

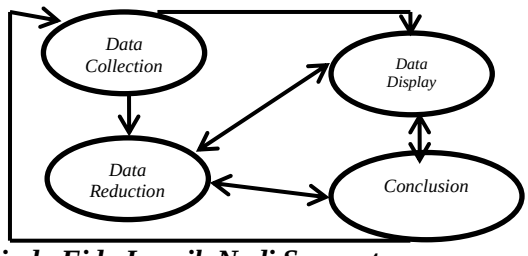


Figure 1. Components in data analysis (Mathew and Huberman, 2009)

- Data Reduction

The activity carried out is filtering the data that has been obtained into 2 parts:

a. Data on physics spots that are relevant to the basic competence of physics grade 12
b. Data on physics spots that are not relevant to the basic competence of physics class grade 12

- Data Display

Activities carried out in this stage are by presenting the data that has been collected into a table / chart / graph. According to filtered data.

- Conclusion

At this stage the data that has been converted into tables will be described in the form of sentences and paragraphs, analyze the suitability of the concepts on the spot to the basic competences of physics class grade 12, and provide conclusions on the results of the research that has been done.

### 2. Exploratory Factor Analysis

The response from visitors can be seen through a questionnaire on the results of interviews with visitors. In this study, the visitor response questionnaire was analyzed by exploratory factor analysis using the Kaiser-Meyer-Olkin (KMO) test and the Bartlet test. Kaiser-Meyer-Olkin (KMO) test is a value that compares a correlation value with partial correlation (Yamin & Kurniawan, 2014). To perform the Kaiser-Meyer-Olkin (KMO) test, SPSS statistical software is used with the following steps:

- First, open the SPSS application
- Entering data to be tested
- Select the analyze menu, click data reduction, and click factor.
- Enter all variables into a variable column.
- Click The descriptive button, click initial solution, and click KMO and Barry's test of sphericity, click anti image, and click continue.
- Click the extraction button, click the scree plot, and click continue.
- Click the rotation button, click loading plot, click the varimax method, and click continue.
- Click OK and the output will be displayed (Yamin & Kurniawan, 2014)

**Table 1. KMO assessment**

| Score | Criteria |
|---|---|
| ≥0,9 | Marvelous |
| 0,80-0,89 | Meritorious |
| 0,70-0,79 | Middling |
| 0,60-0,69 | Mediocre |

| | |
|---|---|
| 0,50-0,59 | Miserable |
| ≤0,50 | Unacceptable |

(Widarjono, 2010)

Table 1 is a table of KMO-Bartletts test which shows the feasibility of factor analysis. In general, the high the KMO value, the better the factor analysis. As seen in Table 3.1, the minimum KMO value must be 0.50 for the eligibility value. In determining the formed factors, it can be seen in the extraction component used orthogonal (varimax) rotation table (Wachidy & Supardiyono, 2018).

## RESULTS AND DISCUSSION

After conducting interviews with several officers, two rides can be used to learn, namely the infinity world and the fun tech zone (Suprapto & Mubarok, 2020). In these two areas, some games or spaces have learning capabilities for high school students from grade 10 to grade 12, and the results are shown in the table and figure below.

**Table 2. Correlation of Infinity World and Fun Tech Zone with High School Basic Competencies**

| No. | Place | Name of physics instrument | Grade | BC |
|---|---|---|---|---|
| 1. | Fun Tech Zone | Light step | 12 | 3.9 |
| 2. | | Lets smash | 12 | 3.9 |
| 3. | | Characteristics of laser | 12 | 3.9 |
| 4. | | Elasticity | 11<br>12 | 3.2<br>3.9 |
| 5. | | Hall of fame | 12 | 3.9 |
| 6. | | Penalty goal | 12 | 3.9 |
| 7. | | Balloon splash | 12 | 3.9 |
| 8. | | Bom hunter | 12 | 3.9 |
| 9. | | Goe sand interactive | 12 | 3.9 |
| 10. | | Science center | 11<br>12 | 3.11<br>3.9 |
| 11. | | Virtual coster | 12 | 3.9 |
| 12. | | Laser action | 12 | 3.9 |
| 13. | | Inclined plane | 10<br>12 | 3.8 & 3.9<br>3.9 |
| 14. | | Face swap | 12 | 3.9 |
| 15. | | Giant piano | 12 | 3.9 |
| 16. | | Sketch of the quarium | 12 | 3.9 |
| 17. | Fun Tech Zone | Tv interactive | 12 | 3.9 |
| 18. | Infinity World | Time Tanel | 11 | 3.11 |
| 19. | | Strech maze | - | - |
| 20. | | Electonase | 11 | 3.11 |
| 21. | | Sky walker | 10<br>11 | 3.8<br>3.11 |
| 22. | | Beach infinity | 11 | 3.8, 3.9, & 3.11 |
| 23. | | Jungle bridge | 11 | 3.11 |
| 24. | | Wobly | 11 | 3.11 |
| 25. | | Fire | 11 | 3.5 & 3.11 |
| 26. | | Crazy shout | 11 | 3.11 |
| 27. | | 1000 mirrors | 11 | 3.11 |
| 28. | | Plasma magic | 11 | 3.11 |
| 29. | | Kaleodoscope | 11 | 3.11 |

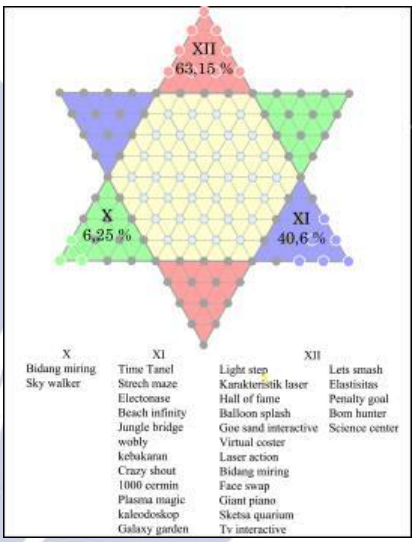


Figure 2. Illustration of comparison of the percentage of each spot to basic competencies

Based on the table 2 and figure 2 above, the percentage of basic competencies in grade 12 is higher than grade 10 and 11, so it is quite appropriate to carry out study activities in East Java Park 3 for grade 12. Even though everything is the same in each physics spot in terms of basic competencies, this can be used to focus learning on one subject. The table and illustrations above for grade 11 also have the same potential as grade 12, and a study can also be done for grade 11 because all BC in the Infinity World rides has basic competencies from grade 11. Even though each spot tends to be the same for each basic competency, this can also focus on learning on one subject.

Apart from conducting interviews with officers, a survey was also conducted using a questionnaire and processed using SPSS and Excel with the following results.

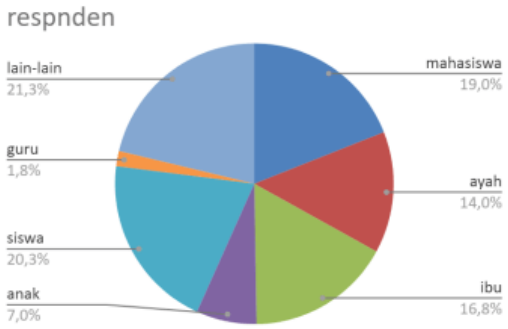


Figure 3. Graph of East Java Park respondents 3

Figure 3 informs that seen from the role of respondents as many as 76 people (19.0%) were students, 56 people (14%) were fathers, 67 people (16.8%) were mothers, 28 people (7%) were children -children, 81 students (20.3%) were studied tour students, seven teachers (1.8%) and 85 (21.3%) were others consisting of managers and visitors.

**Table 3. KMO and Bartlett's Test**

| | |
|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | ,845 |
| Bartlett's Test of Sphericity Approx. Chi Square | 2363,817 |
| df | 45 |
| Sig. | ,000 |

From the results of data processing shown in Table 3, it is obtained Bartlett's Test of Sphericity with Chi-Square value of 2363.817 (df 45) and the sig = 0.000 <0.05. The calculated KMO value is 0.845, and the p-value is 0.000 (<0.05), according to [Suprapto, 2019a; 2019b; Widarjono, 2010], the KMO and Bartlett's test values obtained have the criteria of "useful". Furthermore, according to Wachidy & Supardiyono (2018), the value of KMO and Bartlett's test for the correlation between the desired variables is > 0.50, and the significance of the study is 0.05. Thus, these results can indicate that the data and sample variables used can be continued to the next stage.

**Table 4. Component Matrix**

| | Component | |
|---|---|---|
| | 1 | 2 |
| A1 | ,649 | -,454 |
| A2 | ,698 | |
| A3 | ,763 | -,520 |
| A4 | ,760 | -,488 |
| A5 | ,579 | |
| B1 | ,659 | |
| B2 | ,704 | ,568 |
| B3 | ,678 | ,623 |
| B4 | ,716 | ,537 |

The Component Matrix table 4 shows that the two factors (components) produce a loading factor matrix whose value is the correlation coefficient between the variable (questionnaire) and the factor. In the table, the loading factor has not been able to provide the appropriate meaning ng expected. Each factor cannot be interpreted clearly, where there are variables (questionnaire questions) that are strongly correlated (<0.5) with more than one factor. It can be seen in questions A3, B2, B3, and B4. On A3, factor 1 is 0.763, while in factor 2, it is -0.520 (the negative sign only shows the direction of the correlation). In question B2 the factor 1 is 0.704, while factor 2 is 0.568. Problem B3, factor 1 is 0.678, while factor 2 is 0.623. Moreover, in question B4, factor 1 is 0.716, while factor 2 is 0.537. It requires rotation with the Varimax model with Kaiser normalization.

**Table 5. Rotated Component Matrix**

| | Component | |
|---|---|---|
| | 1 | 2 |
| A1 | ,786 | |
| A2 | ,715 | |
| A3 | ,916 | |
| A4 | ,892 | |
| A5 | ,472 | |
| B1 | ,482 | ,450 |
| B2 | | ,892 |
| B3 | | ,916 |
| B4 | | ,877 |
| B5 | | ,516 |

There are differences in the correlation value of the initial variables with the factors formed before and after the varimax rotation in the Rotated Component Matrix table 5. After rotation, the loading factor has the expected meaning, and each factor can be interpreted clearly. Each variable is only strongly correlated with one factor, the correlation of each variable is not < 0.45 in the formed factor is sufficiently characterized (Comrey & Lee, 1992; Tabachnick & Fidell, 2013). Some of the original variables that have a strong correlation with factor 1 are variables A1 to A5 and the original variables that have a strong correlation with factor 2 are B1 to B5.

**Table 6. Component Transformation Matrix**

| Component | 1 | 2 |
|---|---|---|
| 1 | ,747 | ,665 |
| 2 | -,665 | ,747 |

The Component Transformation Matrix table 6 explains that the original variables have been distributed to each formed factor. In accordance with (Sitinjak, et al, 2017) the correlation value of each variable on the main diagonal is above 0.5, which means that it has a high correlation, namely the two variables have a value of 0.747.

**Table 7. Reliability Statistics**

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|
| ,866 | ,873 | 10 |

From the Reliability Statistics table 7, the Cronbach's Alpha value of the ten original variables is 0.866. As a basis for decision making in the reliability test, the Cronbach's Alpha value is more significant than r table where 0.866> 0.63 with a significance level of 5%, so the questionnaire questions have a fair or consistent level of reliability so that the results of the questionnaire can be trusted (Suprapto, 2019b; Widiyanto, 2010: 43). Then the data from the questionnaire questions can be used as research data.

In presenting the results of the questionnaire responses from visitors and managers to the infinity world rides and fun tech, the results are made in the form of a percentage to find out the percentage of each item.

**Table 8. Results of Visitor Responses on Factor 1**

| Item | Criteria | a1 | a2 | a3 | a4 | a5 | Total |
|---|---|---|---|---|---|---|---|
| 1 | F | 37 | 41 | 72 | 93 | 24 | 267 |
| | % | 9,3 | 10,3 | 18,0 | 23,3 | 6,0 | 13,38 |
| 2 | F | 45 | 42 | 56 | 58 | 23 | 244 |
| | % | 11,3 | 10,5 | 14,0 | 14,5 | 5,8 | 11,22 |
| 3 | F | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | F | 33 | 33 | 43 | 29 | 21 | 159 |
| | % | 8,3 | 8,3 | 10,8 | 7,3 | 5,3 | 8,0 |
| 5 | F | 37 | 33 | 33 | 42 | 32 | 177 |
| | % | 9,3 | 8,3 | 8,3 | 10,5 | 8,0 | 8,88 |
| 6 | F | 33 | 30 | 40 | 41 | 62 | 206 |
| | % | 8,3 | 7,5 | 10,0 | 10,3 | 15,5 | 10,32 |
| 7 | F | 57 | 71 | 52 | 48 | 55 | 283 |
| | % | 14,3 | 17,8 | 13,0 | 12,0 | 13,8 | 14,18 |
| 8 | F | 79 | 67 | 55 | 46 | 77 | 324 |
| | % | 19,8 | 16,8 | 13,8 | 11,5 | 10,5 | 14,48 |
| 9 | F | 43 | 45 | 36 | 31 | 64 | 219 |
| | % | 10,8 | 11,3 | 9,0 | 7,8 | 16,0 | 10,98 |
| 10 | F | 36 | 38 | 13 | 11 | 42 | 140 |
| | % | 9,0 | 9,5 | 3,3 | 2,8 | 19,3 | 8,78 |

In the table 8 above, it is known that the response of visitors and managers to the physics concept of infinity world and fun tech is 13.38% with a frequency of 267 giving a value of 1, 11.22% with a frequency of 224 giving a value of 2, at a value of 3 at all no one gave an assessment. While, by 8.0% with a frequency of 159 giving a value of 4, 8.88% with a frequency of 177 giving a value of 5, at 10.32% with a frequency of 206 giving a value of 6, an assessment of 7 of 14.18% with a frequency of 283, assessment 8 was 14.48% with a frequency of 324, assessment 9 was 10.98% with a frequency of 219, and assessment 10 was 8.78% with a frequency of 140. Based on the percentage, the most extensive assessment was found in range eight, so it can be concluded that visitors do not understand the basic concepts of physics in infinity world rides and fun tech. Visitors can realize that there are physics lessons on these rides, but visitors cannot explain the basic concepts of physics that exist on these rides.

**Table 9. Visitor Response Results on Factor 2**

| Item | Criteria | b1 | b2 | b3 | b4 | b5 | Total |
|---|---|---|---|---|---|---|---|
| 1 | F | 13 | 0 | 2 | 0 | 33 | 48 |
| | % | 3,3 | 0 | 0,5 | 0 | 8,3 | 2,42 |
| 2 | F | 14 | 8 | 9 | 8 | 25 | 64 |
| | % | 3,5 | 2,0 | 2,3 | 2,0 | 6,3 | 3,22 |
| 3 | F | 0 | 0 | 0 | 0 | 0 | 0 |
| | % | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | F | 16 | 6 | 5 | 10 | 23 | 60 |
| | % | 4,0 | 1,5 | 1,3 | 2,5 | 5,8 | 3,02 |
| 5 | F | 34 | 11 | 12 | 15 | 33 | 105 |
| | % | 8,5 | 2,8 | 3,0 | 3,8 | 8,3 | 5,28 |
| 6 | F | 29 | 19 | 17 | 20 | 30 | 115 |
| | % | 7,3 | 4,8 | 4,3 | 5,0 | 7,5 | 5,78 |
| 7 | F | 58 | 44 | 50 | 60 | 54 | 266 |
| | % | 14,5 | 11,0 | 12,5 | 15,0 | 13,5 | 13,3 |
| 8 | F | 93 | 102 | 107 | 108 | 98 | 508 |
| | % | 23,3 | 25,5 | 26,8 | 27,1 | 24,5 | 25,44 |
| 9 | F | 91 | 101 | 106 | 105 | 60 | 463 |
| | % | 22,8 | 25,3 | 26,5 | 26,3 | 15,0 | 23,18 |
| 10 | F | 52 | 109 | 92 | 73 | 44 | 370 |
| | % | 13,0 | 27,3 | 23,0 | 18,3 | 11,0 | 18,52 |

Based on the table 9, the response of visitors and managers to the understanding of the physics' instruments and the curriculum content in schools is to the assessors ranging from one to ten. For the value 1 was 2.42% with a frequency of 48. Meanwhile, for value 2 was 3.22% with a frequency of 64. No one gave a value of 3 so that the number was 0%. The value of 4 was 3.02% with a frequency of 60, the value of 5 was 5, 28%

with a frequency of 105. Then, the value of 6 as much as 5.78% with a frequency of 115. A value of 7 as much as 13.3% with a frequency of 266. A value of 8 as much as 25.44% with a frequency of 508, and a value of 9 as much as 23.18% of 463. Last, for the value of 10 as much as 18.52% with a frequency of 370. Seeing the inclination of the percentage results where the value is more in the range 8-10, we can conclude that visitors agree that field observation/field trips are related to the school curriculum and need to be held these activities are to support existing learning in schools.

## CONCLUSION

Based on the interviews conducted, conducting learning activities at Jatim Park 3 for both grade 12 and class 11. Even though each spot's basic competencies are the same, it can be focused on one subject.

The calculated KMO value is 0.845, and the p-value is 0.000 (<0.05), and it can be said that the data can be used. The correlation value of each variable on the main diagonal is above 0.5, which means that it has a high correlation, namely the two variables have a value of 0.747. The Cronbach's Alpha value of the ten original variables was 0.866. Cronbach's Alpha value is greater than r table where 0.866> 0.63 with a significance level of 5%, so the questionnaire questions have a good or consistent level of reliability so that the results of the questionnaire can be trusted.

Based on the percentage of factor 1, it is found that the largest assessment is in the range eight and factor 2 at 8 to 10 so it can be concluded that in factor 1 visitors do not understand the basic concepts of physics in infinity world rides and fun tech and in factor 2 visitors agree that observation activities field trips/field trips are related to the school curriculum and these activities need to be held.

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