

Development and Validation of Comics on Selected Topics in Physics

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Abstract - This study is concerned with the development and validation of comics on selected topics in Physics for use as an instructional material in teaching the subject. Specifically, it sought to find out the kind of comics that can be produced as an instructional material in teaching Physics, the significant difference between the pretest and posttest scores of the students, and the level of acceptability of the comics among the respondents. The respondents consisted of 102 fourth year students of Southern Luzon Polytechnic College Laboratory High School for Academic Year 2003 – 2004. The researcher used the descriptive method to gather the necessary data in writing the instructional material and the achievement test. The experimental method was employed to determine the validity of the instructional material in Physics. Z-test and weighted mean were used to interpret the data. The statistical analysis showed the gained scores in the posttest as seen in the computed means of the pretest and posttest which are 26.66 and 37.36, respectively. The computed z-value of 12.50 is at 0.01 level of significance which means that there is a significant difference between

the pretest and posttest scores of the students in the achievement test. Meanwhile, a grand mean of 3.45 or a descriptive rating of acceptable of the comics on selected topics in Physics was obtained.

Keywords - Development and validation, comics, physics

INTRODUCTION

Real life experiences provide the most direct type of learning, but they are difficult to supply in the traditional classroom. Most experiences in the classroom occur through verbal symbolism, that is, written and spoken words. These classroom experiences may be easier for teachers to supply, but they are difficult for the students to understand. Verbal symbolism depends on the ability to conceptualize and think in the abstract, while the impact of first – hand experience is immediate and accurate. Various multisensory instructional aids such as texts, pictures, games and simulations can substitute for first hand experiences and enhance understanding so they are an integral part of the learning activity.

According to Flear (1992), high quality instructional materials involve more than a textbook for students. There may be interactive CD's, supplemental videotapes, internet research sites and formal assessment programs as well as instructional support for the teacher. The list for available materials and components for science educators to choose from is daunting. Hence, to bring about a significant conceptual change, it is necessary to engage students at a sufficient deed intellectual level. Nevertheless, there is a need for instructional materials that foster the active mental participation of students in the learning process.

Through the aforementioned premise, the researcher was motivated to produce and validate comics as instructional materials in teaching Physics at Southern Luzon State University Laboratory High School. This was in accordance to the supposition that all students have different interests and abilities which determined what they attend to and learn. Needless to expound, what they learn also depends on the

ability of the teacher to capture their attention and spark their interest through the use of appropriate instructional materials.

OBJECTIVES OF THE STUDY

This study targeted to develop and validate comics as instructional materials in teaching selected topics in Physics. Particularly, it attempted to determine the kind of comics that can be produced as an instructional tool in teaching Physics; the significant difference between the pretest and posttest scores of the students before and after the administration of the instructional aid; and the level of acceptability of the comics among the respondents of the study.

FRAMEWORK

Regardless of the type of instructional aid to be used, a teacher must consider it in the light of the purpose of the learning activity. The instructional aid must be suited to that objective purpose – whether it be subject matter mastery, skills development, or valuing. Although materials and media can stimulate and maintain student interest, they are not meant merely to entertain the students; students need to understand this fact. Unless students are properly guided, they become distracted by the attention – getting aspects of the instructional aids and lose sight of their educational significance (Orstein, 1990).

The types of educational materials used most by teachers are written texts (textbooks, workbooks, pamphlets, magazines and newspapers), pictures and models, and material used in association with games. They may be printed materials, that is prepared and published commercially, or duplicated materials, that is prepared by the teacher or school. Sometimes slight modifications or supplements to published materials will make them suitable to use. Other times totally different materials are needed. If none of the printed materials seems usable, you have to consider making your own.

Because every student has complex and unique needs, the strategies and tools of instruction must be constantly modified so that each student can succeed at learning. Researchers at the Center for Literacy and Disabilities Studies have identified five dimensions of learning

tasks that teachers can modify to engender success. These are physical demands, sensory demands, communication demands, experience demands and emotional demands. Believing that comic strips suit to the above scopes, Benezer, et.al. (1999) stated that these materials can be incorporated into science lessons for reasons such as to record ideas and experiences, to determine prior conception, to teach new concepts, to reinforce concepts, to monitor students understanding, and to assess student learning. Furthermore, he added that comic strips encourage students to be active thinkers about what they are learning. It can convey what the students have learned, indicate areas requiring clarification, reveal the level of student understanding and reveal the progress of the student.

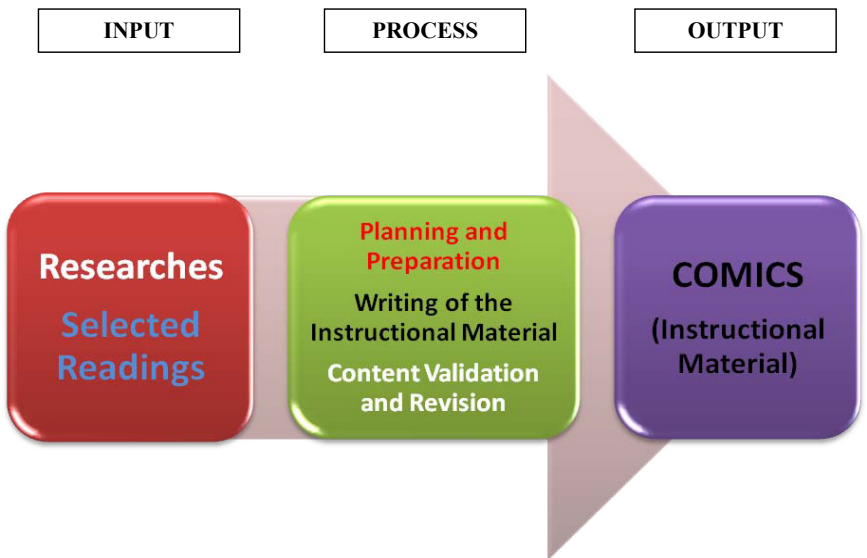


Figure A. An Input-Process-Output Research Paradigm of the Instructional Material for Teaching Physics

The figure above shows the input-process-output scheme of the research design employed by the proponent. On producing the material, the researcher undergone various steps such as gathering data through reading books and other related materials which serve as a guide in making the instructional material. This constitutes to

the input of the study. Considering the nature of the subject and the respondents is also a part of this initial phase. For the processing, the succeeding steps were followed, viz: (1) planning and preparation; (2) making the instructional material; and (3) content validation and revision. After these processes, the comics as instructional materials was ready for pilot testing and try-out.

METHODOLOGY

The study was divided into two major phases, namely: (1) Development and Validation of the Achievement Test with sub-stages such as (a) Construction of the Table of Specifications, (b) Development of the Achievement Test, (c) Validation of the Achievement Test, and (d) Administration of the Achievement Test; and (2) Development and Validation of the Comics as an Instructional Material which involved (a) Identification of the Topics, (b) Development of the Comics, (c) Validation of the Comics, and (d) Administration of the Comics.

The descriptive method of research was employed in sorting out information contributory to the components of the aforesaid study. For the respondents, 102 fourth year Southern Luzon State University Laboratory High School students were purposively selected to try-out the material and answer the achievement test afterwards.

Meanwhile, the researcher also constructed a questionnaire to determine the level of acceptability of the comics to the users. Further, to find out the significant difference in the performance of students before and after the use of the instructional material, the z-test formula was used. For the level of acceptability of the comics, weighted mean served as the determinant. As a whole, the statistical analysis was done using the Statistical Package for Social Sciences or the SPSS Program.

RESULTS AND DISCUSSION

Table 1 shows the comparison of the mean and standard deviations of the students during the pretest and posttest. It shows that out of fifty items, the mean scores of the students in the pretest is 26.66 with a standard deviation of 6.58 while the mean score in the posttest is 37.36 with a standard deviation of 5.61. The standard deviation in the

posttest is lower than the standard deviation in the pretest. This shows that the scores in the posttest are closer to one another. The difference between the means is 10.71 with respect to the posttest. Based on these, it can be deduced that the use of comics in Physics lessons is advantageous for the students.

Table 1. Summary of values for testing significant differences between the pretest and posttest scores

	N	Total Number of Items	Mean	SD	Difference between Means	Z-Test
Pretest	102	50	26.66	6.58	10.71	12.50
Posttest	102	50	37.36	5.61		

To determine the significant difference, the z-test was applied. The computed z-value of 12.50 was compared to the tabular value of 2.58 at 0.01 level of significance. Since the z-value is greater than the tabular value, it can be said that the difference is significant. Thus, it can be concluded that comics is an effective means of raising the achievement level of Physics students.

Table 2. Weighted mean on the acceptability of the comics on selected topics in physics

CRITERIA	WM	DR
I. Accuracy of the Material		
1. The topics are well-arranged to provide clear sequence for understanding.	3.53	SA
2. The comics provide sufficient repetition of learning through examples and illustrations to easily understand the concept.	3.49	A
3. The comics are appropriate to the age, maturity and experience of the user.	3.40	A
4. The ideas and concepts are well-expressed in the comics.	3.41	A
5. The comics relate to present learning on the different contents in Physics.	3.62	SA

Average Weighted Mean	3.49	A
II. Clarity of the Material		
1. The concepts in the comics are clear and easy to understand.	3.28	A
2. The comics have adequate margins, legible typeface and comfortable type size.	3.29	A
3. The size of prints for every box is readable and can easily be recognized.	3.25	A
4. The layouts and graphics in the comics are attractive.	3.30	A
5. The dialogues in the comics are easy to understand.	3.47	A
Average Weighted Mean	3.32	A
III. Appeal to Target User		
1. The titles used in the comics capture the interest of the user.	3.28	A
2. The comics are presented at a pace that allows for reflection and review.	3.39	A
3. The comics stimulate the user to have interest in Physics.	3.53	SA
4. The comics are worth the time, effort and expense.	3.36	A
5. The comics enable the user to develop his/her critical thinking and problem-solving skills.	3.56	SA
Average Weighted Mean	3.46	A
IV. Originality in Presentation		
1. The design and appearance of the comics are exceptionally different from other graphic illustration.	3.29	A
2. The comics serve as a new basic model in teaching and learning Physics.	3.72	SA
Average Weighted Mean	3.50	SA
GRAND MEAN	3.45	A

The table above reveals the responses on the acceptability of the comics on selected topics in Physics. For the accuracy of the

material, the weighted means obtained are 3.53, 3.49, 3.40, 3.41 and 3.62. The average weighted mean is 3.49 and the descriptive rating is acceptable. Regarding the clarity of the material, the weighted means are 3.28, 3.29, 3.25, 3.30 and 3.47. The average weighted mean is 3.32 and the descriptive rating is acceptable. Appeal to the target user got the following WM's: 3.48, 3.39, 3.36, 3.53 and 3.56. The average weighted mean is 3.46 and the descriptive rating is acceptable. For the last criterion which is originality of the presentation, the weighted means are 3.29 and 3.72. The average weighted mean is 3.50 and the descriptive rating is strongly acceptable. The grand mean is 3.45 and the overall descriptive rating is acceptable.

Based on the results in Table 2 on the acceptability of the comics, the researcher inferred that the developed instructional material is well-understood and accepted by the users.

The findings of the study disclose that the instructional material in a form of comics had been developed. The topics included were: scientific notation, conversion of units, law of inertia, law of acceleration, weight, free fall, momentum, work, conservation of energy, buoyancy, static electricity, electromagnetic induction and Coulomb's law of electrostatic.

The mean scores of the students in the pretest and posttest were 26.66 and 37.36 while their standard deviations were 6.58 and 5.61, respectively. The computed z – value of 12.50 is greater than the tabular value of 2.58 at 0.01 level of significance which means that there is a significant difference between the pretest and the posttest scores of the students in the achievement test.

A grand mean of 3.45 on the acceptability of the comics on selected topics in Physics was obtained. It has a descriptive rating of acceptable.

CONCLUSIONS

Based on the findings, conclusions drawn are the following:

Comics can be developed as instructional material in teaching Physics. Comics are an effective instructional material in teaching Physics. Comics on selected topics in Physics are acceptable.

RECOMMENDATIONS

In view of the results of this study, it is suggested that:

1. Teachers may adopt the developed instructional material in Physics.
2. Other self-instructional materials may be developed, adapted to the needs of the students not only for better learning of specific topics but also for enhancing achievement in the whole course.
3. Other subject areas or disciplines can also devise instructional materials like comics to facilitate self-learning and to lighten the teachers' task of guiding their students to understand concepts.

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