A Paradigm in Education: Validation of Web-based Learning for Young Learner

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***Abstract*—** The use of Web-based resource provides a useful tool for enhancing lifelong learning through technology in the Web 2.0 learning environment. A paradigm shift from traditional learning style to technology innovations has opened up more opportunities for educators to practise accordingly. In this paper, the Web-based Fun reading resource is addressed as a tool to be used collaboratively in order to evaluate learners' satisfaction concerning the resource. The present study generated a two-step model to measure: (i) usefulness; (ii) ease of use; (iii) ease of learning and (iv) satisfaction level of primary learners working with the English Primary Fun resource. The Rasch Model was employed for the overall reliability analysis. Data collected from 250 primary learners were tested with confirmatory factor analysis using AMOS 18.0 to obtain three best-fit measurement models from the two latent variables, which are EPFun and learner's Fun factors. Structural equation modelling (SEM) was employed to determine the relationship of the variables that define the resource. The findings confirmed: (i) young learners showed positive responses to acquiring a reading habit through the Web-based resource; (ii) 96% of respondents expressed satisfaction with the Web-based resource; (iii) evidence for a three-factor measurement model: usefulness, ease of use and ease of learning for Web-based resource, hence, learners' acceptance of the resource is explained; iv) there was a significant relationship between the satisfaction level of young learners and the Web-based resource. Implications of the findings are the springboard to prove that young learners are ready for the paradigm shifted to include the Web-based learning for educating and engaging the children to read English meaningfully and for enjoyment in and outside the classroom, especially in local context.

***Keywords*—** Rasch measurement, Structural Equation Modelling, teaching and learning in 2.0, Web-based learning.

I. Introduction

RPID technological advances, especially the Internet, have contributed to a growing impact on learning; particularly collaborative learning that can be assessed anytime, anywhere, and have received overwhelming worldwide response. The World Wide Web, as system of interlinked hypertext documents accessible via the Internet, has become the great multimodal medium of information to ensure messages are disseminated and read all over the world. As the content and language used are real and authentic, the Internet is clearly a useful source for language teachers and learners [1], [2], [3], [4], [5], [6], [7]. With the massive growth in the use of websites on social activities, it is a novel task to consider integrating the activities for the benefit of teaching and learning.

In this context, the Web-based learning resource is an alternative to meet the expectations and needs of students in line with current modes of learning style. As such, the Smart school and the production of source materials are examples of technology-based initiatives to change the ways of teaching and learning, which have become more interesting, multimodal, and the quality of education to trigger higher-thinking skills among the students [8]. As highlighted in the Education Reform in Malaysia Report 2012, information communication technology (ICT) is expected to boost the process of teaching and learning.

Learners will be able to access a wider range of content that is more engaging and interactive. They will be able to learn some lessons at their own pace, try to solve and ideally collaboratively using the authentic resources from the Internet to scaffold the learning process. Meanwhile, educators will have access to both national and international learning resources and communities to assist them in cultivating their practice. Within this paradigm, ICT over the next 13 years will become a ubiquitous part of schooling life, [9], [5] with no urban-rural divide, and all teachers and students will be equipped with necessary skills to use and transform the national education system to be on par with and comparable to that of developed nations.

II. Problem Statement

Despite technological advancements and increased literacy practices, students show a lack of reading comprehension in academic performance, particularly at institutions of higher education, They thus could be severely handicapped due to their poor reading proficiency and inability to acquire the required contents and skills [10],[11], [12]. This alarming statement reflects an obvious gap between available technology and current classroom teaching methods that should be tackled as early as the learning stage of primary school. Given the students' tendency toward digital technologies, can reading proficiency and comprehension, be enhanced by integrating more technology into literacy instruction?

In fact, technological advancements should allow educators to reach more students on differentiated levels, promoting thought-provoking and critical engagement during reading instruction. The availability of digital technologies influences today's primary learners. They bring to school a rich and

diverse set of literacy practices and background that is often unacknowledged or underused by educators.

The Malaysian educational system is exam-oriented. Teachers place much emphasis for their students to achieve high scores in the national examinations, often using the chalk and talk approach. Textbooks and printed materials are the main instructional media use, since these are the materials, which they consider sufficient to enable the students to perform well. Malaysians need a fresh and new philosophy in their approach to exams. Nevertheless, the Malaysian Ministry of Education is shifting to new paradigm to ensure the school-based assessment is materialised in line with other countries like the United States, Britain, Germany, Japan and Finland.

Hence, as a step towards managing the Web 2.0 technologies in classroom education, we focus our study towards learners' perceptions and readiness on the matter in terms of their satisfaction using the Web-based learning. Learners' satisfaction could portray the early readiness towards learning in a 2.0 learning environment.

To measure that, researchers constructed items, which aim to investigate a person's behaviour, and it is equally important to be aware of the crucial task of constructing high-quality items. Thus, valid measurements that will reveal the findings are expected to be materialised. To address the task, Rasch measurement analysis and SEM provide general guidelines in assisting the researchers to measure the reliability and validity of the items based on the Web-based learning resource developed. In relation, it is proven that EPFun resource generated high item reliability of 0.96 and a person reliability of 0.93, which is accepted and considered reliable [13].

III. Methodology

The study was carried out using the quantitative approach on a sample of 250 students from 5 Malaysian randomly selected primary schools. EPFun questionnaire consists of 40 polytomous (5-point Likert scale) and dichotomous items, and is comprised of five constructs, namely, Usefulness (USE), Ease of Use (EOU), Ease of Learning (EOL), Satisfaction (SAT), and Learner's Fun Factors (LFF).

Rasch Measurement was used in examining the reliability and validity of EPFun in analysing item polarity, item fit, item-person reliability and separation index, item-person mapping, fit statistics, and item probability curve. Once overall analyses had been satisfied, in-depth analyses for each construct was then examined separately in order to determine its reliability and validity individually. After instrument reliability and validity had been analysed, Structural Equation Modelling (SEM) was then used to determine the EPFun measurement model. Descriptive analysis was used to determine the EPFun student profile.

IV. Findings

The findings are divided into three sections. The first section addresses the reliability and validity of EPFun resource according to item-person reliability, item-person separation index, item-person mapping, and item probability curves. The findings of SEM analyses are then presented in order to determine the relationship of variables that define EPFun. Lastly, the third section presents the EPFun student profile via descriptive statistics.

A. Reliability and Validity

The reliability index is used to determine the reliability of the items and persons, where a reliability index of > 0.80 is accepted and considered reliable [13]. Table 1 shows that EPFun has a high degree of item reliability of 0.96 and a person reliability of 0.93.

Table 1 – Item-Person Reliability and Separation Index

	Reliability		Infit MNSQ			Outifit MNSQ		
	Reliability Index	Separation Index	Max	Min	Mean	Max	Min	Mean
Item	0.96	4.75	2.20	.48	1.01	2.47	.40	1.12
Person	0.93	3.62	3.85	.22	1.22	3.84	.22	.1

Figure 1 presents item difficulty locations and distribution of respondents along the logit scale. Item difficulty measures about 6 logits (from about -1.0 to +5.0 logits). For this study, person/respondent regarding the EPFun estimates spans about 6 logits (from -1.0 to +5.0 logits) as shown in Figure 1. Looking at the item and person distributions, several problems are revealed. First is the targeting of the items. On the right hand side of the variable map, the items are located against the logit scale in which the location of person performances tell us something about the existence of the ability of primary school learners who sat for the survey.

They are represented by the numbers on the left hand side of the map. They are nicely spread out over 6 logits with more learners in the middle and towards the top of the map and a bit of a tail towards the bottom [13]. Less than half of the persons are located opposite the items- so they seem not well targeted by these items. This inevitably contributes to the precision calibration of person measures. Generally, it can be seen that most items are distributed towards the bottom of the map. It shows that the items are relatively easy for the respondents.

In terms of the capacity of the items to define a continuum of increasing strength, there is evidence that this has been achieved. As for the items spread along the logit scale; however, there is some redundancy in item difficulties. Many items have the same difficulty level. In developing a short version of the scale, some of these items can be dropped whilst maintaining the capacity of the scale to define a continuum of increasing intensity. However, in selecting which items to be dropped, two things need to be considered. First, the standard errors of the items selected should not overlap. How well the items have defined a construct of increasing intensity is determined by evaluating the degree to which the difference between item calibrations is substantially greater than their respective standard errors [13].

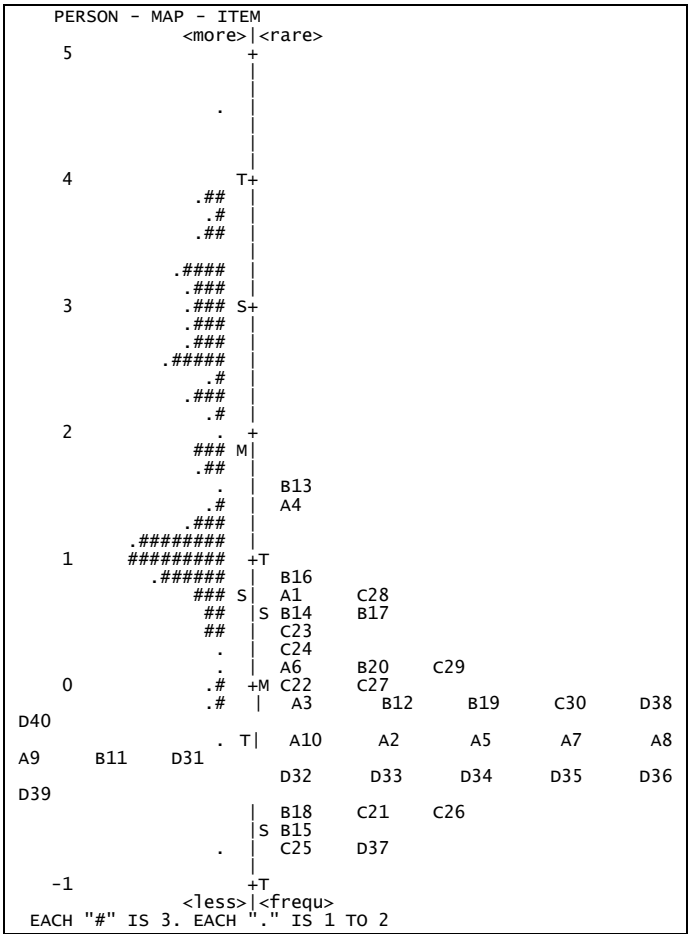

Fig. 1 Item-Person Map

Items and respondents that did not adequately fit the model requirements were identified using the Infit and Outfit mean-square (MNSQ) statistics as illustrated in Table 1.Mean-squares show the size of randomness, i.e., the amount of distortion of the measurement system. The expected value for these fit statistics is 1.0 [13]. Values less than 1 indicate observations that are too predictable (redundancy, model overfit). Values greater than 1.0 indicate unpredictability (unmodeled noise, model underfit). Infit is an information-weighted fit statistic, which is more sensitive to unexpected behaviour affecting responses to items near the person's measure level. Outfit is an outlier-sensitive fit statistic, more sensitive to unexpected behaviour by persons on items far from the person's measure level [13].

While there is no specific rule defining acceptable fit, the conventional values used for rating scale analysis are those less than 1.4 and greater than .6 [14]. What this means is that, items or respondents showing more randomness/noise in their response patterns and less randomness than expected by the Rasch model are considered unacceptable and not useful for measurement. Therefore, in this study these cut-offs were used in the determination of fit for both items and persons.

The summary statistics indicated that the global fit of data (the 40 items in the EPFun measure) is close to the expected value of 1.0. The mean Infit and Outfit MNSQ statistics (Table 1) are 1.01 and 1.12 respectively. At the individual item level, 9 items (22.5% of total items) had Infit MNSQ statistics of over 1.4 and 13 items (32.5% of total items) with Outfit MNSQ statistics of above 1.4 (Refer to Tables 3 and 4). Of the 22 misfitting items, 4 were 'usefulness' items, 11 'ease of use' items and 7 'ease of learning' items. The 9 misfitting items (i.e. A1, A4, B13, B14, B16, B17, B20, C24 and C28) had both Infit and Outfit MNSQ statistics of over 1.4 respectively. These misfitting items require investigation to determine possible reasons that could explain why some persons were not responding to them in a way that is expected by the model thus contributing to the misfit.

Since the empirical evidence has proven EPFun to be reliable and supported the argument for the validity of EPFun, the next procedure is to determine the category rating scale. Figure 2 illustrates the categories of probability curves for EPFun. Diagnostics in the rating scale met the criteria in which the thresholds should increase by at least 1.4 logits to show distinction between items, but not more than 5 logits, to avoid large gap in the variable. In relation, a monotonic increase was seen in all items moving along the rating scale. In other words, the observations that measured should increase consistency parallel to the rating scale [13].

Figure 2, presented the results from the re-categorization of the variable (i.e. with "strongly disagree" and "disagree" treated as the same response, so as "agree" and " strongly agree" were presented in each of the response category. Average measures increasing monotonically with the rating scale for each item is also an indication that the rating scale is functioning as expected for each item in the survey instrument. Thus, collapsing categories 2 and 3 had improved the rating scale diagnostics [13].

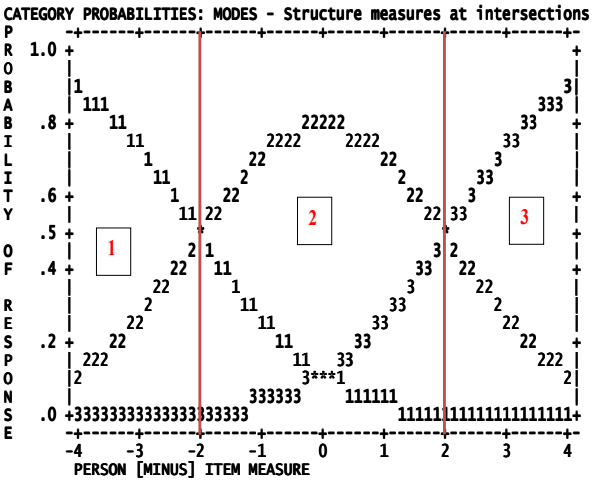

Fig. 2 Person Agreeability Minus Item Endorsability of 11223 Collapsing (Category probability curves for a rating scale item with 2 thresholds)

B. Structural Measurement Model

Figure 3 shows the results where it was found that the magnitude of the factor loadings were substantially significant, congruity index; CMIN /df = 2.608, CFI = 0.992, TLI = 0.982 and RMSEA = 0.080 indicates that the data of the sample (n =

250) correspond to the EPFun model.

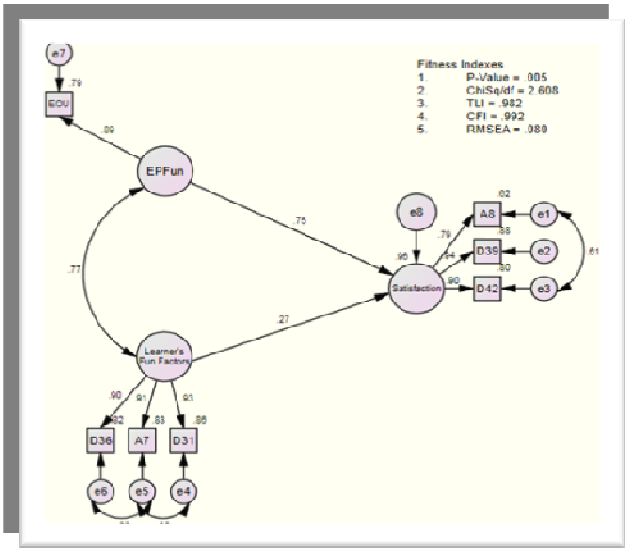

Fig. 3 EPFun Measurement Model

The CFI (0.992) and TLI (0.982) fit indicators exceed threshold of 0.90, indicating a good fit. The root-mean square of approximation (RMSEA = 0.080) indicate a good fit, and the normed chi-square met the required threshold of < 5, where a value between 1 and 3 indicate a high goodness of fit value [14]. Hence, the fit indices indicate a good fit, where the latent variables are indeed measured by the two observed variables. Measures of the model were then calculated using AMOS version 18. Acceptable thresholds of fit indices were analysed according to the fit indices stipulated [14], [15], [16] in Table 2. All fit indices were found to fall within the stipulated range.

Table 2 – Index Goodness of Fit

Name	Acceptable Threshold	EPFun Model
Normed chi-square (x^2/df)	≤ 5.0	2.608
Chi square (p)	≥ 0.05	0.05
Root mean square residual (RMSEA)	≤ 0.08	0.08
Tucker Lewis Fit Index (TLI)	≥ 0.90	0.982
Comparative Fit Index (CFI)	≥ 0.90	0.992
Loading	≥ 0.60	0.79 – 0.94

C. *Student Profile*

Results show that satisfaction of the learners with the EPFun resource is quite high in their estimation: 45% agreed and 42% strongly agreed that they were satisfied with this resource. Analysis showed that only 10% of respondents' expressed disagreement or strong disagreement with the statements that measure their level of satisfaction, while 3% were undecided. Figure 4 exhibits the findings of an analysis of the learners' satisfaction with the EPFun resource.

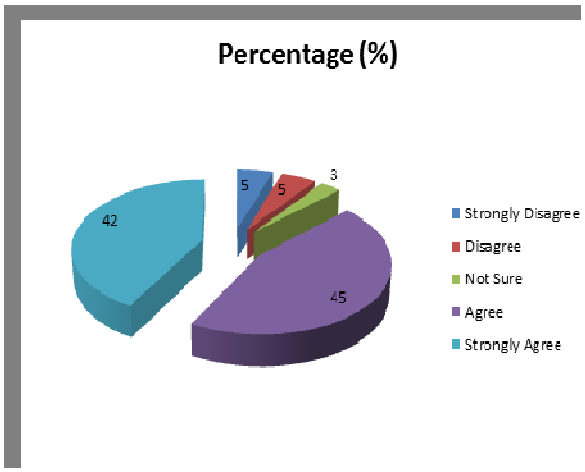

Fig. 4 Findings of the analysis on learner's satisfaction with the EPFun resource

V. Discussion

Overall, the results found EPFun to be a reliable resource, which consistently produces accurate measurements. This means that when EPFun resource is administered to other samples of the similar characteristics, it will be able to produce stable and consistent measures. This study utilized the measurement model in Confirmatory Factor Analysis (CFA) for the aspects of learner's factors and the EPFun resource in regards to the learner's satisfaction. This shows that learner's satisfaction can be explained by a one-dimensional construct in learner's factors and three-dimensional constructs, which are: (i) usefulness; (ii) ease of use; and (iii) ease of learning, in the EPFun resource. This finding indicates that the model derived from the learner's satisfaction as measured by the two dimensions (the learner's fun factors and the EPFun), which used the adapted instruments, is valid and reliable for measuring learner's satisfaction.

The findings from the Confirmatory Factor Analysis (CFA) contributed to carrying out the Structural Equation Modelling (SEM) analysis. The findings showed that the two-dimensional study of the learner's fun factors and the EPFun affected learner's satisfaction. This judgment was based on the results of SEM analysis performed and the value of loading factors obtained that showed the two dimensions of the learner's fun factors and the EPFun affected learner satisfaction in using the EPFun resource. The "squared multiple correlation" (R2 = 0.96) or 96% showed the level of learner's satisfaction in using the EPFun resource. The results of this analysis indicated that the strength of the contribution of learner's fun factors and the design of the EPFun resource influenced the learner's satisfaction significantly.

In this study, the fun concept is related to both cognitive and affective elements. Although highly abstract, it is simple and serves to integrate several underlying processes. The element of fun is empirically proven an important factor in the determination of the two-dimensional aspect salient here in connection with satisfaction using the resource: namely the

learners' fun factors and the EPFun resource. The learners displayed a sense of positive impact regarding the fun learning aspect, since they stated that they required a number of interesting games for them to maintain their interest to read and play. This was highlighted by the respondents' statements when the data was triangulated during the semi-structured interview protocol. For them, the fun is sustained in their mind as well as in action as they used the EPFun resource to read and play. The discipline of human-computer interaction that the learners underwent in terms of fun learning is an outcome of engaging in simultaneous play and learning activities [5], [6], [7], [9].

The fun aspect of this study indicates that the relationship is consistent with the findings by [5], [6], [7], [9] in which they stressed that the quality of resource design and content design demonstrated the appropriate resource to be used to achieve a high level of learner's satisfaction. The level of readability of the texts used in the EPFun resource is appropriate for the lower and average reader proficiency levels. The Flesch Reading Ease score supports this: it was 71.3 (text scale), indicating that the text used in EPFun resource is easy to read for primary learners, roughly 6th grade level in the United States in terms of the Flesch-Kinkaid scale. This easy reading helps to stimulate the readers to learn and enjoy the fun reading as well.

The use of plain language that suits the level of primary learners is another aspect why this resource is marked by reading at ease. This also triggers the element of fun, because the learners are provided with appropriate font type and size as well as a suitable layout accompanied by beautiful, interesting and eye-catching colourful fun pictures to begin with. These are all parts of significant aspects designed to catch young reader attention, encouraging them to read and focus on the activities laid out for them. In addition, the formation of an online learning environment, which is also supported by face-to-face learning, exerted a positive impact on the level of learner's satisfaction as well.

The EPFun resource is Web-based. It addresses the online concept of learning that empowers learners for self-access exploration during the learning experience. This learning concept has implications for theories of learning involved in reading English and the pedagogy of teaching English as a second language. The outcomes may well enhance the positive impact in helping the Malaysian Ministry of Education instil an enhanced interest in reading in the target language, especially in instruction for primary learners. This study is another springboard for a future similar study within the educational environment developing in the 21st century; there is a need for continuous empirical snapshots within in-depth research on analogous phenomena in a range of schools and teaching ecologies and other related fields, especially where young learners are concerned.

To avoid boredom and lack of interest in reading English, the presentation done in the EPFun resource should be projected to depart from the customary norms of reading practice often associated with a difficult, bulky and uninteresting textbook. Presentation of information with the help of images, graphics and audio, essentially multimodal, can initiate and spur the learner's better understanding of the text at hand. In addition, the use of graphics and images in different colours helps to create in young learners a tendency to better remember what is essential, strange, odd or in a list prepared for them, and to remember this more easily. Thus, with the use of attractive colours, this can energise and facilitate better remembrance compared with the black-and-white layout.

This study addressed the Web 2.0 applications, such as SlideShares, Google.doc and Google.form, Chat Room and other Web 2.0 in many ways. Multimodal presentations in the links provided, such as National Geographic Kids, Discovery Kids, Kids World Fun and Learn English Kids help to attract the attention of learners because those were different from other PowerPoint presentation the learners had ever seen. A variety of educational games can be accessed from the links, which are meant to be interactive and comprise fun learning sites. Thus, adapting the material commonly seen in print but transformed through this new multimodal presentation can assist in making the learning process more interesting and captivating. Nevertheless, the dynamic interaction between student-teacher-materials is important in ensuring that the learning process remains interesting and meaningful.

The EPFun resource is fully equipped with links that point to educational information and are fun to explore, full of interesting games and other innumerable attractive features to be attended to. A majority of the respondents declared they were very comfortable and always looking forward to browsing the blog of the EPFun resource. Why was that so? As far as the technology goes, the children really engaged themselves in doing the activities provided. Initially, before they were permitted to browse the fun links provided, they were requested to perform the reading exercises and practice on the main screen of the blog. They needed to complete the tasks laid out for them before proceeding to the next area of gaming zones and other fun domains. From a pedagogical perspective, learning to read in English was an integral component of the process. The learners really demonstrated a high interest in participating in and engaging with the SlideShares and other forms of information provided.

VI. Conclusion

This study managed to explain the importance of using technology in the form of a Web-based learning tool to be exploited in learning to read in English in primary schools in Malaysia. Knowing that the development of online learning is possible within the context of the primary educational system in Malaysia, as this study clearly showed, efforts should be developed as a means to attract learners toward new multimodal modes of learning. The findings from the study showed that the primary learners were highly satisfied with the quality and design of the interface EPFun resource, the

development of the environment, as well with the approaches employed.

The diversity of approaches in the classroom should not only be based on the use of printed materials alone to achieve good results. Learners should not be bound solely to an examination-oriented curriculum. To promote affective domain development and appeal to student motivation and levels of satisfaction and excitement is equally important. It needs to be facilitated and initiated to generate curiosity in achieving the goal within the domain specified. Like any other technology applications available, there is no doubt that today's digital native learners can have a significant impact on efforts to change and further modernise the current educational system. Technology is just a complex of devices for a learner to be engaged with. Yet how it is being used meaningfully and appealing to learner affect and motivation is a significant issue that needs to be encountered wisely, with an open eye and bolstered by empirical research. To conclude, the EPFun resource is another effort from a desire to shed more light on the role and effects of a Web-based learning English reading resource that incorporates reading ease, high levels of interest and meaningful material, while at the same time triggering and spurring fun learning as a whole.

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