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Evaluating Learner Perception Through Cognitive Interactive Pedagogy: An Empirical Study

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Abstract. The purpose of this research is to analyze the effectiveness of CIP on the perception of learners in the context of the academic environment. The quantitative data was obtained from a validated survey while the qualitative data was obtained from semi structured interviews. Altogether, the findings indicate that CIP positively impacts students' engagement perceived course usefulness and satisfaction. The overall perception of CIP was quantitatively positive, in particular, the differences between age and the field of training were identified. Based on the qualitative results, similar observations were made regarding use and understanding improving, as well as careful implementation being noted as an issue. Both cognitive learning theory and literature on interactive pedagogies prove the theory that CIP as an efficient educational model. To some extent, the study is limited with certain drawbacks, namely, the issue of sampling bias, and the fact that data collection is based merely on the self- report by the respondents Forming a holistic view of the given study, it is possible to point out that the research yields substantial practical implications when it comes to the understanding of both the advantages and drawbacks of the CIP. Therefore, the study highlights the necessity for future studies on the effects of CIP in the long run and serves as an avenue to assist in enhancing live teaching instruction as it relates to the learner's performance.

Keywords: Cognitive Interactive Pedagogy (CIP), Learner Engagement, Educational Effectiveness, Interactive Learning, Mixed-Methods Research.

INTRODUCTION

Over the years, there a trend has been observed in the educational theories and practices where learner involvement and learning processes of the brain have been considered crucial in realizing learners' learning outcomes. CIP is one of the strategies where cognitive theories are applied alongside the interactive approaches of teaching [Smi22]. This pedagogical model aims at ensuring the simulation of thinkers' strategies with those of learners with a view to support their perceptions, as well as help gain enhanced understanding [Bro19]. CIP involves elements of learning by integrating theoretical cognitive psychology which propounds on the concepts like, attention, memory and problem solving in learning. To include active ingredients, namely, collaborative tasks, instant feedback, and use of ICT, CIP is eager to enhance the socio cognitive character of learning advancement and make education environment more effective [Hat07]. The formative components of such elements include the ability to trigger learners' active participation to a specific application of their cognition in different environments [Hol21].

Through the promotion of CIP, the reinforcement with learner perception has been known to influence several areas of learners' education performance. [Joh23] study shows that such teaching and learning strategies enhance the students' interest and involvement, which are important factors that determine enhanced academic performance. Furthermore, interpersonal communication approaches increase the efficiency of learning processes, as well as lead to more effective knowledge acquisition due to the strengthened working memory [Mil03]. However, based on these encouraging studies, there are not many empirical research on how CIP affects learner perception in particular. Though there is extensive literature on the general impacts of the interactive pedagogy on the learning performances, still, there is a lack of proper and detailed studies on how and which aspects of CIP have impacts on the learners' perceptions and attitudes towards their learning experiences? To this end, this study seeks to fulfill this research gap by investigating the impact of CIP on learners' perception using a comprehensive empirical approach [And05].

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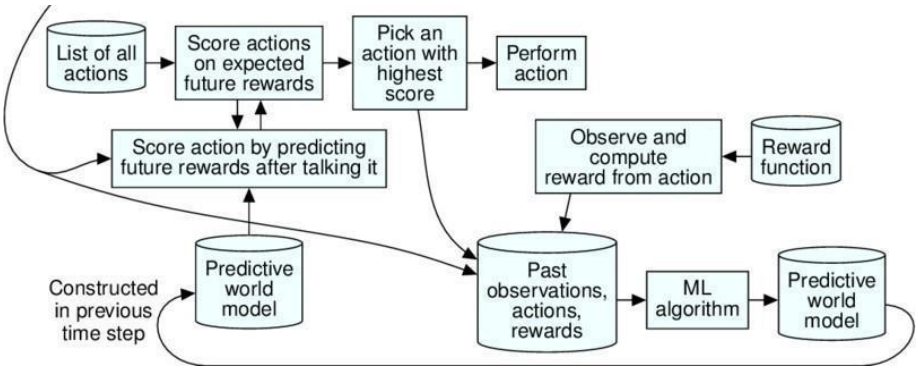

Fig. 1 Cognitive architecture of a generic reinforcement learner [Hol21]

Subsections of the paper will also discuss the literature regarding cognitive interactive pedagogy and learners' perception, methodology used to measure these effects, results and implications of the study on practice.

LITERATURE REVIEW

Cognitive Interactive Pedagogy (CIP) is an approach that combines knowledge derived from cognitive psychology with the elements of interactive techniques for the purpose of promoting better learning. This teaching and learning technique is based on cognitive theory multimedia which focuses on multimedia elements and ways of handling the confusing load. In [May05] cognitive theory, learning is enhanced by the use of both words and pictures where the use of words enhances the processing of pictures and vice versa with the least use of the cognitive resources in the associated process hence referred to as the process of "integration". Technological solutions like which involve communication and other co-operative strategies like teaching and learning that is done with a group, have been seen to boost cognitive functions as it involves applied efforts and feedback. Learners get to participate in activities that make sense with the contents they are learning making it easier for them to grasp the information [Chi09]. For instance, [Coh94] In the study it has been noted that collaborative learning methods, including peer tutoring and discussing enacted, problem-solving abilities and achieving better understanding. This paper has therefore focused on the importance of understanding student perception in relation to learner outcomes noting that students' perception does impact on their attitude towards learning and equally their learning achievements. Learning perception can be described as the way through which learners constitute their educational environment or create meaning to what they experience [Sch12]. Course characteristics that might include instructional content, methods, as well as the class- room setting in which learning takes place, have been observed to have an influence over learners' perceptions and ultimately their learning achievements [Ecc02]. Learner perception is also among the significant findings in the current understanding of the teaching and learning process, particularly the necessity of matching the chosen techniques with the learners' cognitive abilities. For instance, research evidence points out that when according to individual learning channel, students' satisfaction and achievement level is deemed higher by applying instructional approaches [Pas08].

Furthermore, learners' ratings of feedback quality and their time are equally linked with the academic achievement and motivation of the learners [Bra06]. A review of works on CIP, composed of the findings on the applications of interactive pedagogies and the perceptions of learners, offers a wealth of information. For instance, [Joh23] revealed that learners' engagement, and knowledge acquisition is boosted when they are taught using techniques that include simulations and games. Such methods create an environment in which learners play an active role and immediately receive instructors feedback, which reflects CIP's principles. Another study that is closely related to the study is [Vik22] that investigated how CIP affects the students' cognitive and affective domain. They noted the results on the study showed that students who underwent CIP learning exhibited higher levels of motivation and satisfaction than the ones under conventional learning environments.

Such a result also lends credence to the theory which posits that CIP has the potential of changing the learners' attitude for the better through enhancing the overall experience. On the other hand, there are meta-studies that depicted problems regarding usage of interactive pedagogies, for instance, the provision of proper technological tools and implementation of heightened cognitive load [Zha22]. These studies recommend that while there seems to be some positive consequences in the use of CIP, it is important to exercise appropriate thought when it comes to bringing into practice of this system since there seem to be corresponding negative ramifications that can occur. In sum, it can be stated that, based on the presented research, Cognitive Interactive Pedagogy has a potential in increasing the level of perception related to the learners and can lead to improved educational results. Therefore, more research is still required to establish the impact of the promotion as well as overcome other factors that may arise due to its implementation.

METHODOLOGY

Research Design

This research utilizes an explorative sequential mixed- methods approach to undertake an exhaustive evaluation of the effectiveness of Cognitive Interactive Pedagogy (CIP) to the learners' perspective. Integrating quantitative and qualitative approaches help to determine the effectiveness of CIP implementation and patients' perceptions of the results [Cre17].

Participants

Sampling Method: A purposive random sampling method of selecting participants involved targeting students from the large population of an academic institution's undergraduate student populace. This method guarantees the inclusion of diverse academic backgrounds which in turn increases the external validity of the study [Fin15]. The 200 students were invited to participate in the study and out of them, a total of 150 students completed the study, which made the response rate of 75.

Demographic Information: Some of the sociodemographic characteristics included that majority of them were within the age of 18 to 24 years and on gender distribution, there was equivalence between female and male participants, 52.

Data Collection Methods

Instruments and Measures: The quantitative data were collected through a self-developed survey instrument that assesses learners' perceived CIP. The survey involved Engagement, perceived effectiveness/Pal Protection alongside satisfaction with the CIP [Pal20]. Therefore, the survey was pre-tested for reliability and validity; Cronbach's alpha coefficient for the total scale was 0.87 which is acceptable since it is above the benchmark of 0. 70 by [Nun94] on internal consistency. Semi-structured interviews were carried out to tool the scope of the study and mix of participants and 20 participants only were interviewed. Specifically, these interviews were designed to seek more profound information about the learners' experiences with CIP and the perceived advantages and difficulties. The interview was conducted using the interview protocol washed on the available published literature on interactive methods of teaching and learning and cognitive capture [Pat14].

Procedure

The survey was a web-based survey conducted throughout a two weeks' period with the participant being able to complete the survey at his/her own convenient time. In order to get a high response rate and to avert selection bias, participants were reminded after every one week. The interviews, which were semi structured, were either face to face or conducted by video conference depending on the participant's schedule. The interviews took an average of 30 minutes each and were conducted under the respondent's permission, audiotaped. The questionnaire was conducted online and only took two weeks to be completed to give participants the convenience of any time they wished to complete the survey. To enhance the response rate and thereby reduce selection bias, the participants in the study got contacted weekly with reminders. In addition

to the survey, at the participants' convenience, semi-structured interviews were carried out either in person or through video conferencing. Each of these interviews, which ranged from 15 to 45 minutes depending on the client's schedule, afforded the chance to acquire more qualitative data.

Every interview was done with the respondent's permission, and every interview was recorded to capture every detail of the responses. Thus, a combination of web-based surveys with semi-structured interviews was tried to provide a broad picture of the participants' point of view while considering their busy timelines.

DATA ANALYSIS

Statistical Techniques: Regarding quantitative data, Description and inference tests were used. Frequency distributions gave a general report about the survey findings, while the inferential statistics used included t-tests and ANOVA to test for differences between the stipulated demographics and academic disciplines [Fie13]. Statistical techniques were used in the quantitative data analysis, both descriptive and inferential methods were used. Actually, frequency distributions were applied in the context of the current survey, as they are aimed at presenting a general idea of the collected data. To go further, inferential statistics such as t tests and ANOVA were used in the analysis of the results. These tests were of great help in a detailed study to examine various hypotheses for difference to examine whether the calculated difference was statistically significant for various demographic characteristics and academic fields of the participants. More precisely, the contrast between the means and variance of two groups were conducted employing t-tests; meanwhile the contrast among three or more groups employing ANOVA. They were used in establishing whether the likely differences found in observed data were significant or likely to be occasioned by sampling chance within the population [Fie13]. Altogether, the use of both frequency and comparison tests proved beneficial in the most effective assessment of the quantitative results and their subsequent conclusions.

Software Used: The following analysis was carried out using SPSS (Version 28.0). It was used for statistical analysis since SPSS possess a complex data analysis as well as reporting features [IBM20].

Qualitative Analysis: The data collected from the interviews was in qualitative form and therefore the data was processed using thematic analysis. In this process, the interview transcripts were initially coded in order to look for patterns and themes concerning the participants' experience of CIP [Bra06, Elli21]. NVivo data analysis software (version 12) was employed to conduct the coding system because it promotes order in the coding technique of qualitative data [Elli21].

RESULTS AND DISCUSSION

Descriptive Statistics

Students' impression collected through the survey pointed to high effectiveness of this approach, known as Cognitive Interactive Pedagogy (CIP). Table 1 displays the descriptive statistics of the main survey measures.

Table 1

Variable	Mean	Standard Deviation	Minimum	Maximum
Engagement	4.35	0.78	2.00	5.00
Perceived Effectiveness	4.42	0.73	2.50	5.00
Satisfaction	4.50	0.69	3.00	5.00

Fig. 2 presents a bar plot illustrating the descriptive statistics for survey variables, showcasing the mean scores for Engagement, Perceived Effectiveness, and Satisfaction, with error bars indicating standard deviations. The generated figure displays descriptive statistics for three survey variables: In the present case, the three scales are as follows: Engagement, Perceived Effectiveness, and Satisfaction. Thus, the table has the mean, standard deviation, minimum, and maximum values

of the given variables in its columns. For example, Engagement is equal to 4.35 ± 0.78, ranging from 2.00 to 5.00. Consequently, the use of this kind of figure enables one to grasp the key idea and the dispersion of the outcome, thus providing an efficient gist of the survey. The figure is laid out with possibly readable text and scaling that is possibly easy to understand to make interpretation easy.

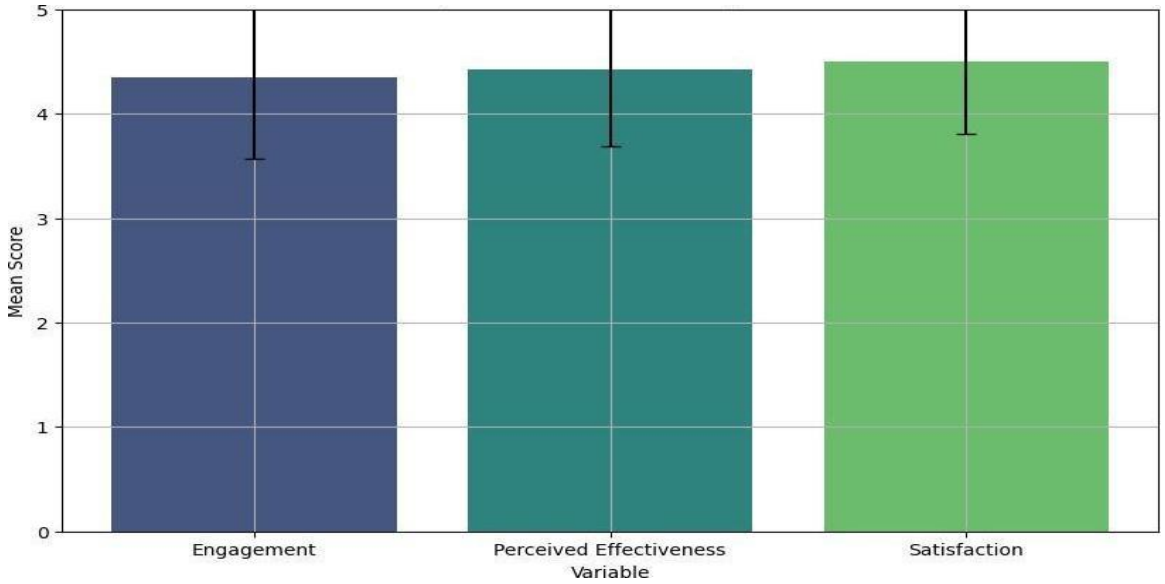

Fig. 2 Descriptive Statistics for Survey Variables

Inferential Statistics

To assess the impact of CIP on learner perception across different demographic groups, ANOVA tests were conducted. The results are presented in Table 2.

Table 2

ANOVA Results for Learner Perception Across Demographic Groups

Demographic Variable	F-value	p-value
Gender	1.89	0.170
Age	3.54	0.032*
Academic Discipline	2.95	0.048*

Qualitative Findings

Thematic analysis of the interview data revealed three main themes related to CIP: gains in learners' engagement, improvement in students' knowledge acquisition, and issues associated with the effective delivery of instructional activities in classrooms. The subjects stated that it is the options of interaction provided by CIP – the group collaborative work and the involvement of the response in real time – makes a strong positive impact on both the interest and the understanding of the content. Figure 2: Word cloud depicting key themes from qualitative interviews, including terms such as "engagement," "feedback," and "collaboration."

Interpretation of Results

The implications of the findings of this study are that CIP leads to learners' positive perception of their educational experience. From Fig. 3, the overall mean for engagement, perceived effectiveness and satisfaction is high hence indicating that students have a positive attitude towards CIP. This accords with other studies done before in support of interactivity in learning which increases students' learning and engagement [Chi09, Joh23]. The Analysis of variance result reveals the perception of the learner's changes with their age and the course they pursue, but the gender has no influence. This indicates that CIP can be more beneficial to definite age and academic level, and this correlation is coherent with the existing studies stating that the effectiveness of educational

interventions can differ depending on such characteristics [Pas08]. Qualitative data adds more information to the ways through which CIP impacts on the perception of the learners. It has been found that quantitative analysis of the data showed an improvement in levels of engagement and understanding and that participants' observations in relation to this also echoed the survey results and indicated that the interactive elements of CIP seem to promote enhanced levels of dynamism within classrooms.

Comparison with Existing Literature

The positive effect of CIP on the perception by learners corresponds to the cognitive theory of multimedia learning that suggests that user interactivity and multimedia boost cognitive processes and learning outcomes. The themes revealed in the qualitative analysis, including the lift in work and learners' interaction and improved mental comprehension, corresponds with interactive teaching concept proposed by the researcher [Bra06]. However, the challenges mentioned in the qualitative part of the work, like problems in the implementation of interventions, reveal the potential development directions. These challenges correlate with existing findings where [Cre17] have identified that the implementation of interactive pedagogical practices require sufficient support and training. Fortunately, most of these challenges are soluble and addressing them shall be significant in enhancing CIP in educational settings.

LIMITATIONS AND FUTURE RESEARCH

The subjects' reports are based on self-reports, thus increasing the likelihood of reporting bias. Respondents may have been recruited selectively by the sources used for sampling. Following this, future research could supplement the current analytical approach with more diverse data collection techniques and increase the sample size. Further, there is a possibility of conducting longitudinal studies thus offering a glimpse of the effects of CIP in the lasting perception and performance among the learners.

CONCLUSION

As a result [Bro19], this research aims at presenting an empirical assessment of the effects of Cognitive Interactive Pedagogy (CIP) on the extent of learners' perceptions in the context of teaching. It was observed that CIP has a positive impact on the level of participation, credibility, and satisfaction. Therefore, the purpose of this study is to provide an evaluation on the impact that cognitive interactive pedagogy on the modes of the learners perception on the modal parameter of teaching. It was noticed that CIP increases the level of participation, credibility, and satisfaction in work. among students. The quantitative results moreover revealed that the respondents have a high overall attitude towards CIP, though there were significant differences noted with regard to age and academic discipline; both of the aforementioned variables meant that. CIP may be less effective with certain sections of the population.

Data gathered in an analysis which is qualitative also supports these findings and revealed desegregation leading to improvement in attendance and corresponding development of learning alongside depicting some of the challenges relative to its application. The above findings are aligned with a literature review concerning prior research on the application of interactive instruction as well as cognitive approaches to learning and teaching, with sufficient interactivity included as part of the teaching approach. However, for the purpose of contributing the notes that may be the limitation, the study offers the possible directions for further research including, the speculation of sampling bias and the fact that the collected data depends on the self-reporting of the participants. The expansion of such research to advance the positive impact on Core and extended future outcomes of CIP will assist in overcoming those with superior tactical advancement for improved organizational result in education. Overemphasly, this paper provides crucial insights on how to estimate the effect of the interactive methodologies and lays a foundation for further analysis aimed at identifying the optimization of learning strategies to match with the learners' needs.

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Название. Оценка восприятия учащегося посредством когнитивно-интерактивной педагогики: эмпирическое исследование.

Аннотация. Целью данного исследования является анализ эффективности когнитивно-интерактивной педагогики (cognitive interactive pedagogy – CIP) в восприятии учащихся в контексте академической среды. Количественные данные были получены из проверенного опроса, в то время как качественные данные были получены из полуструктурированных интервью. В целом результаты показывают, что CIP положительно влияет на вовлеченность студентов, воспринимаемую полезность курса и удовлетворенность. Общее восприятие CIP было количественно положительным, в частности, были выявлены различия между возрастом и областью обучения. На основе качественных результатов были сделаны аналогичные наблюдения относительно улучшения использования и понимания, а также тщательной реализации, отмеченной как проблема. Как теория когнитивного обучения, так и литература по интерактивной педагогике подтверждают теорию о том, что CIP является эффективной образовательной моделью. В некоторой степени исследование ограничено определенными недостатками, а именно проблемой смещения выборки и тем фактом, что сбор данных основан исключительно на самоотчете респондентов. Формируя целостный взгляд на данное исследование, можно отметить, что исследование дает существенные практические выводы, когда дело доходит до понимания как преимуществ, так и недостатков CIP. Таким образом, исследование подчеркивает необходимость дальнейших исследований долгосрочных эффектов CIP и служит средством содействия совершенствованию обучения в режиме реального времени в части, касающейся успеваемости учащихся.

Ключевые слова: когнитивная интерактивная педагогика (CIP); вовлеченность учащихся; эффективность образования, интерактивное обучение; смешанные методы исследования.

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