

The Influence of Teachers' Pedagogical Beliefs on the Utilization of ICT Resources in Chemistry Teaching in Public Secondary Schools in West Pokot Sub-County, Kenya.

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ABSTRACT

The study focused on how pedagogical beliefs of teachers of chemistry affect how they utilize ICT resources while teaching chemistry in public secondary schools in West Pokot Sub-County, Kenya. Three hundred and eighty-one respondents took part in the study. Ten secondary schools were involved. Purposive and stratified random sampling techniques were used to obtain a sample of 328 third form students, 43 teachers of chemistry and 10 principals. Questionnaires, interview schedules, document analysis guide and observation checklists were used to collect data. Qualitative data was analysed thematically while quantitative data was analysed using the SPSS version 24. Study findings revealed that teachers used ICT resources though not often in a teacher centred approach; even though they held constructivists pedagogical beliefs; espoused positive attitude regarding use of ICT resources and had basic computer knowledge/skills. The study recommended that more INSETs be organized to prepare teachers; Provision of adequate ICT resources/facilities; development and implementation of school ICT policies and finally installation of internet hot spots in all schools by the government, NGO's, among other benefactors.

Key Words: ICT resources utilization, pedagogical beliefs, teacher attitude, computer competence.

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I. INTRODUCTION

Information and Communication Technology (ICT) is one of the principal drivers of economic development and social change worldwide, (R.o.K, 2021. Open, Distance and E-learning (ODEL) have provided an opportunity for learners to access education through technology irrespective of their physical location (R.o.K., 2021). Chemistry is one of the subjects offered in the Kenya secondary school curriculum. KNEC reports of Kenya Certificate of Secondary Education (KCSE) 2018-2022 show that over 99% of KCSE candidates took chemistry as one of the subjects they were examined in. The same reports clearly reveal that students' performance in chemistry was dismal compared to students' performance in other subjects over the same period. (KNEC report, 2022)

“The use of ICT resources in education lends itself to more learner-centred settings” (R.o.K, 2021). Technology can be used in our classroom much more easily if the teaching approaches change from teacher centred to learner centred, (Belay, Wanyonyi & Mugo, 2020).

1.1 Statement of the Problem

Across the world, governments are investing substantial resources in the ICT sector and especially in education with the hope of transforming education and preparing itself to be competitive on the global stage. In Kenya, all students at the secondary school level are expected to take at least two sciences that constitute part of the core curriculum. Of the two sciences, almost 100% of students take chemistry as one of the sciences, KNEC reports (2018-2022). However, KCSE examination analysis by the CQASO West Pokot County indicated that the performance by learners in this subject is dismal. This finding is corroborated by KNEC reports of 2018-2022. Could the problem be how teachers are covering chemistry syllabus?

1.2 Objective of the Study

To examine how pedagogical beliefs of teachers affect their use of ICT resources while teaching chemistry in public secondary schools in West Pokot Sub- County, Kenya.

1.3 Research Question

How do pedagogical beliefs of teachers of chemistry affect how they utilize ICT resources while teaching chemistry in public secondary schools in West Pokot Sub-County, Kenya?

II. LITERATURE REVIEW

2.1 Theoretical Framework

The study was anchored on the Unified Theory of Acceptance and Use of Technology (UTAUT) that was developed by Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). According to Venkatesh, et al (2003), Social influence is the extent to which an individual perceives that important others believe he/she should use a given system or tool. Considering that this research targets teachers of chemistry and the principals of their respective schools, it is possible to apply social influence as a construct in the proposed research, since school principals are involved. Principals have direct influence on the teachers whom they supervise as role models as well as supervisors. Pedagogical beliefs of the principals have an effect on teachers of chemistry pedagogical beliefs because they both directly and indirectly influence how teachers implement curriculum.

2.2 Empirical Review

Liu, Lin and Zhang (2017) while citing Ertmer et al., (2012) opines that, “Of the many internal and external barriers identified, teachers’ pedagogical beliefs stood out as having a significant influence on the effective use of ICT in teaching.” Murithi and Yoo (2021) posits that teachers’ beliefs play a fundamental role in the teacher development process, especially in the acceptance of new approaches, techniques, and activities.

Research has revealed that learner-centred pedagogical approaches are more effective in a teaching/learning transaction. They allow the learner to construct knowledge and learn at their own comfortable pace. Learner centred approaches are backed by constructivism learning theory. The use of ICT during instruction may help change pedagogical approach towards the learner centred, (R.o.K, 2021).

Pedagogical beliefs are critical and determine how teachers teach in class. However, some researchers have found out that a teacher’s pedagogical belief do not automatically translate to their classroom practise.

III. METHODOLOGY

Research Design and Data Collection

The study adopted a descriptive survey research design. This study involved principals, teachers of chemistry and form three students who took chemistry in the targeted secondary schools in West Pokot Sub-County. Ten sample schools had 10 principals who were purposefully

sampled, 143 teachers of chemistry where only 43 were sampled and 2,318 form three students taking chemistry where only 328 were sampled.

Research Instrument

Questionnaire was used to collect information regarding the teachers of chemistry pedagogical beliefs.

Data Analysis

Collected data was cleaned, coded, key punched into a computer and analysed using the Statistical Package of Social Sciences (SPSS) version 24. Descriptive statistical tools i.e. frequencies, percentages and cross tabulations obtained were used to describe the variables related to the utilization of ICT resources by teachers of chemistry during instruction.

IV. FINDINGS & DISCUSSION

4.1 Constructivist Beliefs

When teachers of chemistry pedagogical beliefs were probed, the following was established. When teachers were asked whether learning meant students should have ample opportunities to explore, discuss and express their ideas, 92.3% (36) indicated that they agreed and or strongly agreed with the statement.

Similarly, 84.62%(33) agreed and or strongly agreed with the statement with the statement that every student was unique or special and deserved an education tailored to his or her particular needs.

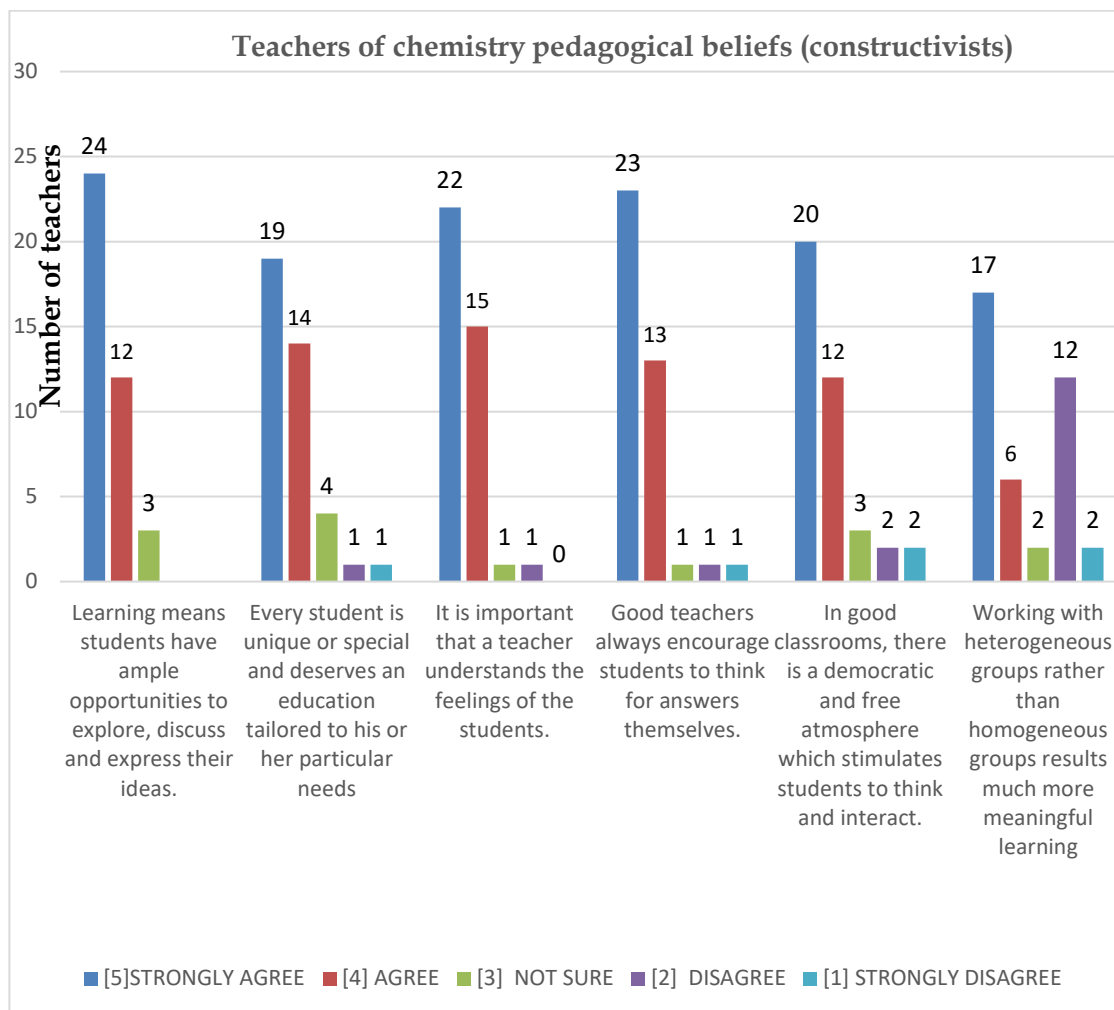


Figure 1 Analysis of constructivists' pedagogical beliefs of teachers of chemistry

Source field survey 2023

When asked whether it was important that a teacher understood the feelings of the students, 94.9 % (37) of the teachers of chemistry agreed and or strongly agreed with the statement. Similarly, 92.3 % (36) of teachers agreed and or strongly agreed with the statement that good teachers always encouraged students to think for answers themselves.

When asked how much they agree with the statement that in good classrooms, there should be a democratic and free atmosphere which stimulates students to think and interact, 82.1% (32) agreed and or strongly agreed.

When the statement “working with heterogeneous groups rather than homogeneous groups results much more meaningful learning” was posed to teachers a significant (14)35.9% disagreed while a majority (23) 59% agreed to the statement.

From the above statements it can be deduced that majority of the teachers responded in a manner that suggested they believed in student centred learning as opposed to teacher centred learning approaches. Teachers of chemistry in the sampled schools believed that students of chemistry should construct chemistry knowledge as opposed to being given knowledge and ideas. According to Arenare (2021) and (Barasa, 2021), teachers with constructivist beliefs were more likely to integrate ICTs during teaching /learning process.

4.2 Transmissive Beliefs

When probed on the transmissive pedagogical beliefs, 92.3% (36) disagreed with the statement “during the lesson, it is important to keep students confined to the textbooks and the desks”. Ninety five percent (37) disagreed with the statement “learning simply means practicing the ideas from teachers without questioning them”.

When the statement, “teaching is simply telling, presenting or explaining the subject matter” was posed to the teachers 76.9% (30) disagreed. As to the statement whether “good teaching occurs when there is mostly teacher talk in the classroom; 69.2% (27) disagreed with the statement. When the statement “teaching is to provide students with accurate and complete knowledge rather than encourage them to discover it” is posed to the teachers 74.4% (29) disagreed with the statement.

Another 89.7% (35) of the teachers of chemistry agreed with the statement; “whole class instruction is much more fruitful than small group instruction”. Respondents might have overwhelmingly agreed to this statement because of the belief that whole classroom instruction presented a mixed ability group, which therefore favoured collaborative learning approach.

As regards transmissive beliefs majority of the responses to statements posed imply that they intrinsically did not believe in knowledge transmission strategies during chemistry instruction. Liu, Lin and Zhang (2017), posit that, pedagogical beliefs play a critical role as far as technology use in teaching/learning is concerned. UNESCO (2018) findings indicate that, “practicing teachers develop a teaching style that blends well with their philosophy of teaching/learning. A position held by (Kimaiyo, Kitaiye & Too, 2016).

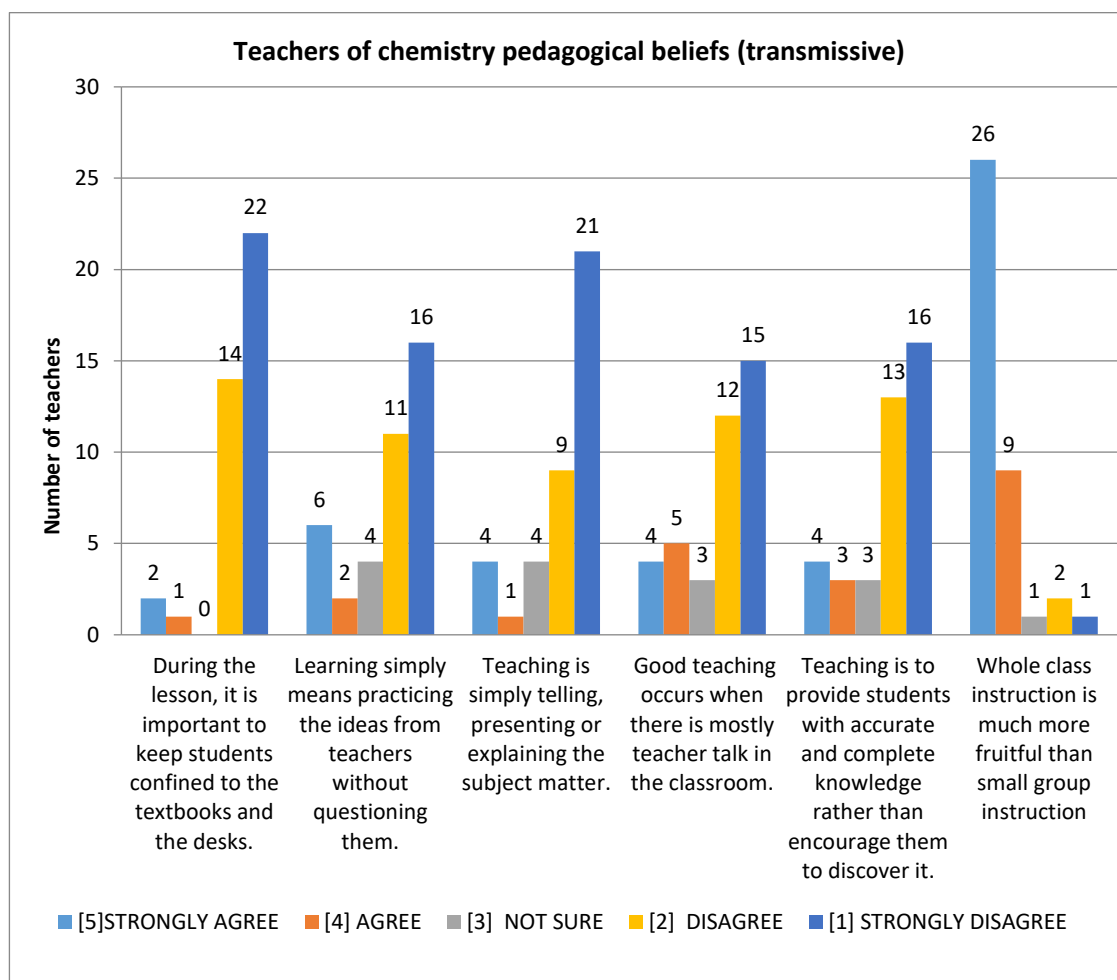


Figure 2 Analysis of transmissive pedagogical beliefs of teachers of chemistry
Source: field survey 2023

From the data obtained regarding pedagogical beliefs of teachers of chemistry, it clearly emerged that a resounding majority of teachers held constructivists/learner centred pedagogical beliefs. Teachers who hold such beliefs are more likely to use ICTs during teaching/learning process (Arenare, 2021). Use of ICT resources help them achieve what they internally belief. Indeed, this was confirmed as it will revealed later regarding utilization of ICT resources. However, Du Plessis, (2016); Kimaiyo, Kitainge and Too (2016) found out that there seemed to be a mismatch between the participants’ espoused beliefs and actual classroom practice with regard to using of ICT resources.

Teachers of chemistry held constructivists/learner centred pedagogical beliefs. Teachers who hold such beliefs are more likely to use ICTs during teaching/learning process (Arenare, 2021). However, Du Plessis (2017) found out that there seemed to be a mismatch between the participants’ espoused beliefs and actual classroom practice with regard to using of ICT

resources. It was found out that despite teachers holding constructivist beliefs, they did use ICTs during instruction sparingly due to inadequacy of ICT resources, lack of adequate requisite knowledge and skills notwithstanding their positive attitude towards utilization of ICTs integration in teaching/learning.

V. CONCLUSION & RECCOMENDATIONS

5.1 Conclusions

Teachers believed in learner centred pedagogical practices, therefore, teachers used ICTs during teaching and learning of chemistry because probably they were more inclined to learner centred pedagogical approach as opposed to teacher centred pedagogical beliefs. However, in utilizing the ICT resources, learners were unable to manipulate the ICT resources due to the inadequacy of the ICT resources. Teachers of chemistry who taught using ICT resources did so in a transmissive manner due to inadequacy of ICT resources as well as limited knowledge on how to integrate ICT resources in a manner that was learner centred. Therefore, teachers of chemistry espoused learner centred pedagogical beliefs were not translated into actual classroom practice, as the teaching/learning processes were teacher centred since learners rarely interacted with the ICT resources.

5.2 Recommendations

- i. Teachers of chemistry need to be well prepared to use ICT resources through chemistry ICT integration tailor made INSETs.
- ii. The schools' B.O.Ms should find ways to avail adequate ICT resources/facilities, employ computer/ICT technicians in schools and ensuring classes are designed with basic requirements to support ICT utilization during instruction e.g. ensuring they have functional power sockets.

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