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**MAKING SENSE OF THE INFORMATION SEEKING  
PROCESS OF UNDERGRADUATES IN A SPECIALISED  
UNIVERSITY: REVELATIONS FROM DIALOGUE  
JOURNALING ON WHATSAPP MESSENGER**

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**ABSTRACT**

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Aim/Purpose	The research work investigated the information seeking process of undergraduates in a specialised university in Nigeria, in the course of a group assignment.
Background	Kuhlthau's Information Search Process (ISP) model is used as lens to reveal how students interact with information in the affective, cognitive and physical realms.
Methodology	Qualitative research methods were employed. The entire seventy-seven third year students in the Department of Petroleum and Natural Gas and their course lecturer were the participants. Group assignment question was analysed using Bloom's Taxonomy while the information seeking process of the students was garnered through dialogue journaling on WhatsApp Messenger.
Contribution	The research explicates how students' information seeking behaviour can be captured beyond the four walls of a classroom by using a Web 2.0 tool such as WhatsApp Messenger.

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Findings	The apparent level of uncertainty, optimism, and confusion/doubt common in the initiation, selection, and exploration phases of the ISP model and low confidence levels were not markedly evident in the students. Consequently, Kuhlthau's ISP model could not be applied in its entirety to the study's particular context of teaching and learning due to the nature of the assignment.
Recommendations for Practitioners	The study recommends that the Academic Planning Unit (APU) should set a benchmark for all faculties and, by extension, the departments in terms of the type/scope and number of assignments per semester, including learning outcomes.
Recommendation for Researchers	Where elements of a guided approach to learning are missing, Kuhlthau's ISP may not be employed. Therefore, alternative theory, such as Theory of Change could explain the poor quality of education and the type of intervention that could enhance students' learning.
Impact on Society	The ability to use emerging technologies is a form of literacy that is required by the 21 <sup>st</sup> century work place. Hence, the study demonstrates students' adaptation to emerging technology.
Future Research	The study is limited to only one case site. It would be more helpful to the Nigerian society to have this study extended to other universities for the purpose of generalisation and appropriate intervention.
Keywords	information seeking process, information seeking, dialogue journaling, group assignment, analysis of assignment, specialised university

## INTRODUCTION

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*Information seeking* is “a conscious effort to acquire information in response to a need or gap in one’s knowledge” (Case, 2006, p. 5). Put differently, it is a conscious and constructive effort to derive the benefit of undistorted meaning from information for the purpose of knowledge acquisition and extension (Kuhlthau, 1991, p. 61). This process requires information handling skills, also referred to as information literacy skills. Wilson (2000, p. 9) views information seeking as “the purposive seeking for information as a consequence of a need to satisfy some goal.”

Fourie (2004, p. 70) opines that information seeking is a complex process, consisting of social, communicative and interactive behaviour. Kuhlthau (1991, p. 61) perceives information seeking as a user’s constructive effort to derive appropriate meaning from information for the purpose of clarity and extension of knowledge on a particular issue or topic. To carry out purposeful information seeking, the information user requires some cognitive abilities and skills to engage with information systems. This is referred to as information literacy skills. Bates (2010, p. 2382) asserts that the term *information seeking* does not take into consideration the other dimensions in which people relate to and interact with information; consequently, with time, the term information behaviour has become the preferred term, employed to encompass all types of research on people’s interaction with information.

The Centre for Information Behaviour and the Evaluation of Research (CIBER) (2008, p. 10) reports that users’ behaviour online is very diverse in terms of geographical location, type of university, and gender and status. Users engage in horizontal information seeking and access authority and sources within a few seconds by relying on popular and favoured brands such as Google. The search engines fit students’ lifestyle almost perfectly more than the physical or online libraries, their online behaviour is more public, and there are myriads of pre-publishing, for example, wikis, blogs and so on (CIBER (2008, p.7). Green and Hannon (2007) expressed the concern of students about the unmanageable scale of the Web and their difficulty to prioritize and evaluate searches. The value of the various Web 2.0 sites lie in the way users are able to classify, evaluate, and add to the content; however, there is a skills gap between using media and how to create meaningful content (EDUCAUSE, 2007, pp. 5-9). Hence, Poore (2009, p. 68), in the study of the Net Generation information behav-

our, implied that users need to be ICT literate too. Even though ICT literacy is crucial, the foundation is information literacy.

The primary aim of this paper is to explore the information seeking processes of Nigerian undergraduates in the course of assignment writing, using Kuhlthau's Information Search Process (ISP) model.

## **LITERATURE REVIEW**

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This section reviews literature on the information behaviour of undergraduates. It covers research in Nigeria, South Africa, and other African countries, as well as across the globe. The purpose is to explore the research on the information seeking process of students in the course of their academic work.

This section also focuses on Kuhlthau's ISP Model -theoretical framework used for the research.

### ***INFORMATION BEHAVIOUR OF STUDENTS***

It is expected that the information behaviour of undergraduates will differ from faculty to faculty. Applied sciences are pragmatic in nature and aim to invent new techniques and products which control the environment. Specifically, engineering is an application focused discipline, the aim of which is to develop products which can be used for practical purposes. According to Heinström (2002, p. 80), the knowledge base is cumulative in science and technology; consequently, discoveries are grounded on former ones. The aim of applied sciences is basically not in understanding "why" but to produce solutions that are both efficient and effective. As an example, professional engineers conduct various tasks, such as design, development, documentation, and implementation. These tasks, whether technical or non-technical, require specific information. Of the various tasks performed by professional engineers, especially designing, testing, manufacturing, and constructing, a final product is required or expected. Therefore in the training of student engineers, they are expected to perform one or more in their final year project.

As in all disciplines where quick and reliable results are expected, the use of Internet in the field of applied sciences is crucial.

Kerins, Madden, and Fulton, (2004) in their study of the information seeking behaviour of Irish engineering and law students found out that easy accessibility is a primary factor in the selection of an information channel by student engineers. Also, the student engineers appear to have a preference for information channels that require the least effort such as the Internet because of its speed and availability of current information sources which feed their initial information need. For most of the engineering students, the Internet is identified as the first information source they explore. However, some of the students who identified the Internet as best source of information for their project also considered it the worst because of information overload. Besides, they are not sure how reliable the information from the Internet is. This is an indication of the fact that they have poor information handling skills. However, some of the students did mention that they use print resources such as books, technical handbooks, and journals as resources to validate the information retrieved from the Internet.

Barker, Cook, and Whang (2006) determined which sources engineering students of the University of Washington College explored for their academic work and the possible reasons for their choice. The investigation was carried out with the hope to use the findings to better inform their library instruction efforts and the services provided at the University of Washington Engineering Library. Findings revealed that engineering students seek to "minimize loss rather than maximize gain" when searching for information, and they value quick, ease of use and convenience over reliability when selecting information sources for their assignment or project. They also use fellow students as information sources; however, librarians and library collections are not frequently consulted. They use the Internet, not because they think it is reliable, but because it is quick and convenient.

In the PhD research of MohdSaad (2008), the information literacy and information seeking behaviour of students conducting final year projects at the Faculty of Computer Science and Information Technology, University of Malaysia, Malaysia was investigated. Findings showed that the majority of the students use resources on the Internet. Other sources students consulted include past year project reports (81.9%), guidelines from lecturers (70.6%), books (69.4%), friends (62.5%) and other reports (50.3%). About 57.5% of the respondents conduct surveys and interviews to gather information from their respective sources, the students. Also, 98.1% use keyword search and 90.8% use subject search when browsing for information via search engines or databases.

Similarly, Kahlal (2011, pp. 15-16) also discovered that engineering students of Royal Melbourne Institute of Technology, Australia, are more comfortable using information available on the Web as their primary tool of information gathering than other tools. The secondary tools are also available online (i.e., databases and library electronic resources), which indicate that students would rather collect information off a computer screen, than make the extra physical effort of seeking academic help by using library hard copy resources.

In 2011, Ejiwoye and Ayandare investigated the level of test anxiety and its impact on the information seeking habit of undergraduate students of the Federal University of Technology, Ondo State, Nigeria. Also determined was the information sources used by the undergraduates. Findings revealed that applied sciences students need everyday life information on sports and healthcare in addition to information for their academic work. However, erratic power supply impacted negatively on their use of the Internet and electronic resources, hence, the mostly consulted information resources by the students were textbooks, reference materials, lecture notes, newspapers, and magazines. Also of concern is the fact that respondents complained of not having access to current and up-to-date information resources in the library.

In summary, applied science students consult the Internet as their first port of call in information seeking, however, with some reservations. They find it easy, convenient, and versatile as a source to meet their immediate information needs, however the reservation comes from the fact that they do not really trust the sources or see it as reliable enough, hence they tend to confirm the online information by consulting print sources. Some of the print sources they consult are textbooks, technical handbooks, and manuals with reliable specific protocols on how to go about their coursework, assignments, and project.

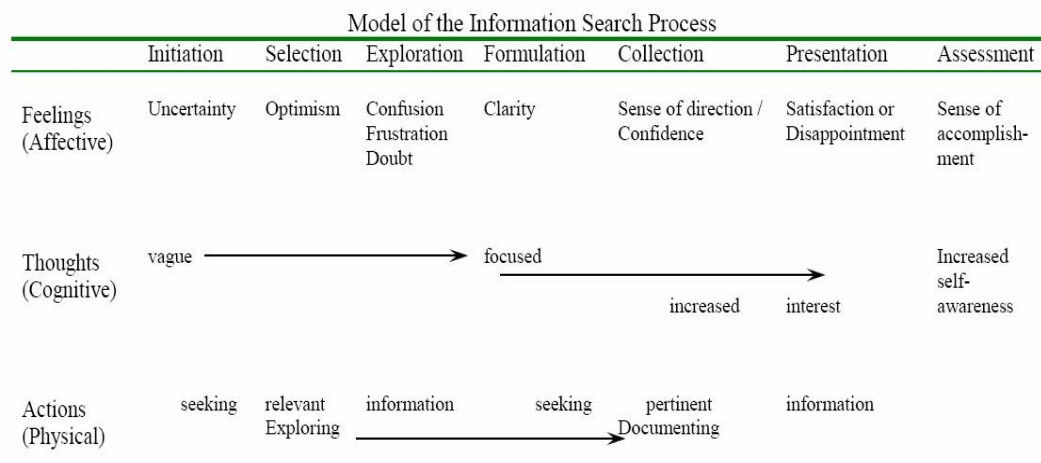
### ***KUHLTHAU'S INFORMATION SEEKING PROCESS (ISP) MODEL***

Kuhlthau's ISP model, which has its roots in both information science and constructivist cognitive learning, presents two unique features of "uncertainty" and "Zone of Intervention". Uncertainty is natural and important for constructing personal meaning in the process of information seeking. Increased uncertainty in the ISP is an indication for the need for intervention (Kuhlthau, 1996, 1999). The ISP model is a process of construction and seeking meaning, influenced by George Kelly's personal construct theory, Kelly (1963 as cited in Kuhlthau, 1996) explains the emotional experience arising from constructing meaning from new information; the information is taken-in in phases and it usually begins with confusion. The process of construction is not just reproducing information but also exploration and formulation, the process of which instils the value of lifelong learning.

In addressing the challenges of "seeking meaning" and "sense-making" in the 21<sup>st</sup> century, Kuhlthau (2008, p. 68) re-emphasizes the fact that the ISP model reveals a process in which a person is seeking meaning in the course of seeking information. The model clearly reveals the link between information seeking behaviour and the impact of information. In fact, from the user's perspective, the two are inseparably connected.

The ISP model in Figure 1 details a holistic stand point of information seeking from the user's perspective in seven stages (Kuhlthau, 2008, p. 67):

- Initiation: this is when a person first becomes conscious of a gap in knowledge or understanding during which the feeling of uncertainty is quite evident.
- Selection: at this stage, a general problem is identified, and the initial uncertainty often declines due to some sense of confidence and a readiness to begin information search.
- Exploration: in the exploration stage, a volume of inconsistent information is encountered. Such information may be overwhelming and incompatible with the topic, hence, the person's level of confusion and uncertainty increases and low confidence level sets in.
- Formulation: formulation of focus is when confidence begins to increase and uncertainty gives way consequent upon a focused perspective.
- Collection: this stage portrays some level of certainty based on focused perspective and hence deep involvement.
- Presentation: at the completion of the search, there is a new understanding which informs learning, sharing and communicating with others.
- Assessment: A positive and conclusive information search gives a sense of accomplishment and increases self-awareness while it is contrary for an information search that is not conclusive.



**Figure 1. Information Search Process (Kuhlthau, 2004, p.82)**

The ISP model as a process of knowledge articulation with varied cognitive and affective stages is relevant in the study of information behaviour irrespective of the information environment, whether print or online media.

Ongoing research reveals that the ISP model is a valid theoretical framework for the study of information behaviour irrespective of the information environment, whether print or online media. Branch (2003) confirms that students experience the phases of the ISP even on the Web (for example, they experience confusion and frustration when they come across barriers in their search), while Broch (2000) emphasizes that the search challenges elucidated by the model may be more serious when searching the Web.

***RESEARCH WITHIN KUHLTHAU’S INFORMATION SEARCH PROCESS (ISP) MODEL***

The Information Search Process (ISP) model, which presents information behaviour as a process of gradual understanding and refinement of a problem area (Kuhlthau, 1993, is a result of more than two decades of empirical research by Professor Carol Kuhlthau, of Rutgers University as mentioned in the previous section.

In Kuhlthau’s first study, she investigated whether users do have common experiences in the process of information seeking that can be articulated and described and whether users’ experiences resem-

ble the phases in the process of construction. A questionnaire was administered to determine perceptions on a 5- Likert scale. She attempted to develop stages along with six categories for each stage: - task, thoughts, feelings, actions, strategies, and mood (Kuhlthau, 2004, p. 36).

- Task Initiation: students expressed feelings of uncertainty
- Topic Selection: uncertainty eased to a degree
- Pre-focus Exploration: could be most difficult stage if there is no focus
- Focus Formulation: for many, this is the turning point in their research effort
- Information Collection: renewed confidence
- Search Closure: begin writing

Major findings of her first study are that patterns experienced by students match those described in the process of construction and the information seeking process model developed. However, the problem with the study is that the initial group is small and not diverse; there is conflict between students understanding of the task versus actual experiences; and students do not perceive librarians as more than locators of resources.

In her second study, there was a large-scale and a more diverse group (low, middle, and high-achieving students). The study was a mix method of qualitative and quantitative research and a longitudinal piece that used process surveys conceptual maps, and perception surveys questionnaire.

The model of information search process is verified in her second study. Findings reveal that learning begins with vague thoughts and low confidence and progresses to clarification and increased confidence. She discovered that there is a correlation between an increase in confidence and teacher assessments of learning occurring and that information search process has more impact on learning than the quantity of resources.

The study conducted by the research team of the Rutgers Centre for International Scholarship in School Libraries in 2003-2005 led by Ross Todd, Carol Kuhlthau and Jannica Heinström provided an ample opportunity to revisit the model and investigate the validity of the model in the current information environment. The investigation involved 574 students in Grades 6 to 12 in ten New Jersey public schools where school librarians and classroom teachers implemented collaborative instructional units of work to engage students in meaningful research on selected curriculum topics (Kuhlthau, Heinström, & Todd, 2008). The pedagogical framework for the instruction was informed by guided enquiry based on the stages of ISP model (Kuhlthau, 2004).

Recently, Kahlal (2011) in his study of the information seeking behaviour of undergraduates in their academic environments, with focus on the impacts of technological advancements on students' capacities, employed the ISP framework. Findings reveal that students felt a lot of stress in addition to lack of confidence when it dawned on them that they lacked the requisite knowledge to attend to a task. However, when the initial search began, relief and confidence started to return but they got overwhelmed when they seemed to experience information overload. This study confirms the cognitive and affective stages of the model.

Kuhlthau's ISP model has been used to structure education programmes. For example, Kuhlthau's model is one of the models in use at the University of the Western Cape, South Africa, to develop an active learning information literacy spiral emphasizing cognitive thinking skills in Library Science 121 (Information Literacy Course) (King, 2007). In their appraisal of the model in 2008, Kuhlthau, Heinström, and Todd confirmed that the model has been very useful in structuring and enhancing education programmes, services, and systems, and this accords the model its credibility in the education world and its uniqueness amongst the information behaviour models. The researchers also reported that the model has been in use as a conceptual framework for developing a programme of inquiry-based learning at the Centre for International Scholarship in School Libraries (CISSL), Rutgers University, USA (Kuhlthau et al., 2008). The model is employed as an instrument for teachers and school librarians to recognize critical moments when instructional interventions are necessary in students'

information-to-knowledge experiences. The model assists students in no little way to get deeply involved in extensive exploration of thoughts and ideas before coming up with their own understanding of their topics and making presentations rather than just gathering information to please their teachers.

Ongoing research reveals that the ISP model is a valid theoretical framework for the study of information behaviour irrespective of the information environment, whether print or online media. Broch (2000) emphasizes that the search challenges elucidated by the model may be more serious when searching the Web while Branch (2003) confirms that students experience the phases of the ISP even on the Web; for example, they experience confusion and frustration when they come across barriers in their search while. In the Web 2.0 world, the affective stages of the model may be more eminent because of the read and write feature of the Web 2.0 platforms.

In her recent research work, Kuhlthau (2012, pp. 17-18) stressed the importance of technological tools as part of everyday life across the globe and that of Web 2.0 which helps to interact, connect, and collaborate. These tools make information instantaneous due to real time access to information. However she alerts one to the danger of everyone having a voice and access. Her concern is about the accuracy and reliability of information being communicated, which is a product of information literacy. Therefore, Kuhlthau's ISP model is relevant even on Web 2.0.

The research work by Orlu (2016) in a university in the United Kingdom investigated the various concerns associated with decisions, actions, choices, and emotions of students through the stages of their search, including search during proposal development, research design, and thesis. Interviews were recorded, transcribed, and analysed using thematic analysis. Findings reveal that the information seeking behaviour of students is organized, and in some cases, random. However, the randomness was glaring during the planning stage of their task. Many student follows Kuhlthau's model in which at the planning stage the search lacks a clear focus. Further indicated was that emotional response to search causes anxiety, apprehension, and confusion. The students studied were Masters students.

## RESEARCH METHODOLOGY

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According to Bryman (1998 in Struwig and Stead, 2001, p. 56), qualitative research methods incline towards understanding issues from the participant's perspective, describe the settings of the participants in context, and understand the thoughts, feelings and behaviours of the participant. The research explored students information seeking and search process in the course of writing an assignment using Kuhlthau's ISP as the lens to reveal how they interact with information in the affective, cognitive and physical realms. The students' assignment question was also analysed using Bloom's Taxonomy revised by Churches (2009).

The entire 77 third year undergraduates, in the Department of Petroleum and Natural Gas a specialised university in Nigeria, and their course lecturer formed the sample the research.

### *DIALOGUE JOURNALING*

The 77 students were on a group assignment in the course of which dialogue journaling took place on WhatsApp Messenger, a cross-platform mobile messaging application that allows instant exchange of texts, audios, and videos ([www.whatsapp.com](http://www.whatsapp.com)). WhatsApp Messenger is compatible with iPhone, BlackBerry, Android, Windows Phone, and Nokia. According to Bouhnik and Dshen (2014, p. 217) WhatsApp groups can be employed as follows: communicating with students, nurturing the social atmosphere, creating dialogue and encouraging sharing among students, and as a learning platform. The students used WhatsApp messenger on their personal electronic device, such as android phones, iPhone, iPad, and BlackBerry.

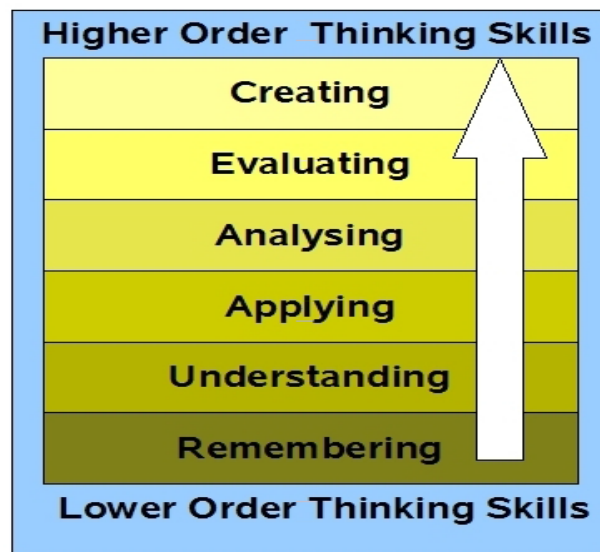
Journaling in the current study is in the sense of *dialogue journaling*, it was a methodological tool adopted for interacting with participants by way of "peering" into their minds during their assignment. Dialogue journaling is a written discourse or dialogue between two or more persons in ex-

change of experiences, ideas, or reflections (Alsaleem, 2013; Haynes-Mays, Peltier-Glaze, & Broussard, 2011). The dialogue journaling exercise with the students was to understand how they go through their assignments, their thoughts, feelings and actions as explained in Kuhlthau's ISP model, during the various stages of assignment writing.

At the end of the journaling exercise, the data was sent from the chat groups on WhatsApp messenger to the researchers email from where it was downloaded, printed and colour coded for analysis.

### ***ANALYSIS OF BASIC PETROLEUM GEOLOGY ASSIGNMENT (PNG 315) QUESTION***

Bloom's Taxonomy (Figure 2) revised by Churches (2009) examines the cognitive domain and categorizes thinking order and skills. This could assist instructors to design class activities and learning outcomes. Bloom's taxonomy is a continuum from Lower Order Thinking Skills (LOTS) to Higher Order Thinking Skills (HOTS) (Churches, 2009, p. 5). For example, a user must first of all remember a concept to understand it, and also a concept can only be applied if understood and remembered. The LOTS is about knowledge acquisition, interpretation, summarising, inferring, describing, and so on while HOTS involve analysing, judging, and producing. However, Bloom's Taxonomy is not an exclusive layer of the thinking process. At the university level, assignments should be tailored in such a way that it encourages critical thinking, evaluation and creativity, among others.



**Figure 2: Blooms revised taxonomy by Churches (2009, p.5 )**

Following are some comments on the assignment question and conduct:

1. The Basic Petroleum Geology Assignment (PNG 315) was a group assignment. Seventy seven students were divided into seven groups; Group A, Group B, Group C, Group D, Group E, Group F, and Group G. That is, 11 students per group, a size that is somewhat too large for effective learning.
2. The instructions from the lecturer were clear as to the mode of presentation in terms of number of pages, font size and font type.
3. Initially, students had only eight days to attend to the assignment. However, the Lecturer later postponed the submission date by four days, making it twelve days. The researcher is of the view that the short time span and the later submission date given during the course of the assignment must have affected the pacing and the quality of the assignment.
4. Students were in seven groups and each group was assigned a specific session from the indicated source (book entitled *Basic Petroleum Geology* by Peter Link), but what to do with the



sections was not clear. However, a group leader explained to the researcher during a private chat that they were asked to read and summarise the content of the various sections assigned. They were also required to consult other sources.

Each of the seven groups was assigned a specific section in the book as follows:

- GROUP "A" = *Earth Structure; Depositional Basins; Post Depositional Processes*
- GROUP "B" = *Petroleum Traps*
- GROUP "C" = *Earth Structure; Depositional Basins; Post Depositional Processes*
- GROUP "D" = *Rocks, Geological Considerations and Engineering Practices*
- GROUP "E" = *Petroleum Traps*
- GROUP "F" = *Earth Structure; Depositional Basins; Post Depositional Processes*
- GROUP "G" = *Rocks, Geological Considerations and Engineering Practices*

Based on Bloom's Taxonomy, this is a lower order thinking assignment because it only encourages students to read, understand, paraphrase and possibly remember.

## RESULTS

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The results of the research are presented in this section. These will be discussed in the light of the Kuhlthau ISP model which is in seven stages: Initiation, Selection, Exploration, Formulation, Collection, Presentation, and Assessment.

The affective aspects of Kuhlthau's ISP are the feelings and emotions information seekers experience in the process of the information search (Kuhlthau, 2004, p. 82). Such feelings include uncertainty, doubt, confusion, frustration, optimism, satisfaction, and confidence, among others.

### *INFORMATION SEEKING PROCESS OF UNDERGRADUATES*

Kuhlthau's ISP model reveals a process of seeking meaning while seeking information (Kuhlthau, 2008, p. 68). It reveals information seeking from the users' perspective in eight stages (Kuhlthau, 2008, p. 67): initiation, selection, exploration, formulation, collection, presentation and assessment.

#### **Initiation**

*Initiation is when a person first becomes conscious of a gap in knowledge or understanding during which the feeling of uncertainty is quite evident, thoughts are vague, and seeking is evident.*

The researcher had the opportunity to chat with some of the students face to face at the very early stage; that is, the first two days of the assignment. Their main complaint and concern was that they had too many assignments and hardly had time to work on them diligently. Rather than worry about the specific assignment in question, the issue was about being saddled with too many assignments. Hence, the dominating emotion was that of work or study under stress and pressure, as expressed below:

*S42(Group D): At the beginning actually, I think I was not sure of the assignment since we have a short period for compiling and other course work and assignments were at their peak.*

*S51 (Group E): The major constraint actually has to do with stress and timing. It has not really been easy to create spare time in working on the project. And again, going online to surf for materials in addition to what we were given has not been easy. You know after gathering materials, the next thing to do is to look for a way to correlate all the materials together so there is uniformity. So it is has really been stressful doing that!*

*S71 (Group G): Our daily schedule of lectures is always tight so most of the time we are very busy. Also the Internet connection in the e-library is slow so it is very undependable.*

Even when interactions started on WhatsApp, students did not seem to express any or much uncertainty or vagueness in thoughts. This may have been due to the fact that the assignment question did

not require much critical thinking. They only needed to read a particular portion of a prescribed textbook, and summarise. Even though they were asked to source for more information, there was already a defined scope for which some were glad as expressed by the course representative S14 (Group B), and a few others:

*S14 (Group B): The material given to us actually covers the aspect of our research to a reasonable extent. I am thankful that our lecturer was able to give us a concise material for the research.*

*S44 (Group D): I extracted only a few vital images from Wikipedia, since the lecturer has given us enough information to work on.*

*S49 (Group D): Actually, the main challenge I faced while doing the project (Rocks) was combining the various ideas I got from the different materials I used.*

*Researcher: Do you mean you are having problems drawing your own summary from the materials you have? You feel overloaded with information or what? Please kindly clarify*

*S49 (Group D): Yes, I felt quite loaded with information. For instance, from the basic petroleum geology textbook by Peter Links that we were given, I saw that the main classes of metamorphic rocks were based on origin while some other materials classified it based on texture only which are foliated and non-foliated.*

*Researcher: So how have you been able to resolve that? S49: I actually gave more preference to the material we were given by partially side-lining the ideas from other materials. I included the textures and used a table to relate the origin and textures.*

Thus, the research shows that the typical expression of uncertainty peculiar to the initiation phase was not evident in this study, contrary to the findings of Kuhlthau (1996, 2004, 2008), Kahlal (2011), and Orlu (2016).

One could infer from the chats with Group D that they were concluding the assignment on the first day of the WhatsApp chat which was the fifth day of the assignment.

*S46 (Group D): Please for the report for geologic consideration and engineering practice, the group members contributing should please submit their part on or before 6 pm (Day 6) on Wednesday so that we can proof read and prepare for the presentation.*

And then a caution from a fellow student who thought the group should not be in a hurry to submit:

*S47 (Group D): Hello my group leader! Good morning sir. I want to suggest that we should not rush and print our report work today, even though the soft copies are ready. Let all the group members have the soft copies first, so that they (we) can go through it during weekend. Then any error noticed should be communicated to the people in charge of the arrangement to be corrected. Then we can print on Monday and submit. This is to ensure that we have error-free report notes submitted. I also strongly recommend that we should thoroughly read the instruction for the report assignment to ensure full compliance to our distinguished lecturer demands and requirements for the reports work. Thank you all!*

*S61 (Group F): I happen to be doing the compilation of the different contributions of the group members and I what have discovered so far is that most of us do not know how to arrange and make our information consistent.*

From the interactions among the students above, it is also evident that not all the members were involved in the assignment writing, which is contrary to the pedagogy of group assignments that involves all members and encourages interactivity as well. Even for those who actively participated in the assignment, it appears they worked individually and then submitted to their team leader for compilation.

*S8 (Group A): But I still have a question on how we will go about the compilation of everyone's contribution because I went through victor's own and it was already 8 pages without diagrams.*

*S31 (Group C): Topics were shared to the 10 members of the group to summarise chapters 1,6 and 8 respectively of a book titled basic petroleum geology by Peterlink and also find some information from other source. Some members submitted their summaries to me yesterday, when compiling it, I arranged the term paper based on first topic to the last topic with the aid of the soft copy of the book we are to summarize, diagrams, presently am trying to insert the necessary diagrams which some of the group members omitted.*

*S61 (Group F): Tobi Solomon submitted his assignment yesterday, while Cobany did submit this morning remaining Prince and Steven.*

These comments show students did not really work together as a group which may have been due to the manner of administration of the assignment as earlier explained. This reveals a trivialization of the pedagogy of group work which is often overlooked in the process of teaching (Sutton, Zamora, and Best, 2005).

### **Selection**

*At this stage, a general problem is identified, and the initial uncertainty often declines due to some sense of confidence and a readiness to begin information search.*

In this assignment, there was no problem to investigate. Hence, students did not necessarily go through the selection phase in which a problem is identified. The assignment question was a “read and summarise” type, a lower order thinking type assignment using Bloom’s taxonomy revised by Anderson et al. (2001). The assignment encouraged students only to read, understand, explain, and summarise. The assignment did not provide room for knowledge application, analysis, evaluation, and even design and construction.

As students did not experience the feelings of uncertainty in the initiation phase, the easing of uncertainty that accompanies the selection phase could not be ascertained as a follow up experience.

### **Exploration**

*In the exploration stage, a volume of inconsistent information is encountered. Such information may be overwhelming and incompatible with the topic, hence, the person’s level of confusion and uncertainty increases and low confidence level sets in.*

Again, the students did not necessarily go through the exploration stage in which low confidence level is expressed due to excessive amounts of information encountered which may be incompatible with the topic. In this case, students were given the information to work with; that is, they were asked to read and summarise certain chapters of the Basic Petroleum Geology textbook by Peter Link. Put differently, there was no research problem to explore. Hence, they did not experience an intense information search, even though they were asked to seek additional information. Hence, a high level of confusion and uncertainty attributed to the exploration phase (Kuhlthau, 2004, 2008, 2012) of the ISP model and low confidence levels were not evident as students were “spoon fed” with the basic information needed. The same topics/themes could have been allotted to students without necessarily tying them to a particular textbook that narrowed their search.

### **Formulation**

*Formulation of focus is when confidence begins to increase and uncertainty gives way consequent upon a focused perspective.*

Students were focused from the beginning on the end of the assignment, because their task was simple, clear and straightforward: “read and summarise”. Hence, they were confident about achieving their goal of finishing the assignment in good time, if anything, the challenge expressed was that of coordinating the group and finding a convenient time to meet. Again, this did not agree with the findings of Kuhlthau (1996, 2004, 2008), Kahlal (2011) and Orlu (2016).

### Collection

*This stage portrays some level of certainty based on focused perspective and hence deep involvement.*

This was not evident in the journals as students had no research problem to solve; hence there was no “focused perspective”. They were required only to read, understand, and explain which was implied in a statement by their lecturer during the chat in Group F:

*I expect that your report is supposed to teach me. So whether I know the terms or not, it is not important. You should understand those terms and explain them to me. This is why I said that if the constraint on pages is too tight, I must be informed first before any additional pages are included. I have extended the maximum number of pages for two groups because of this. So, research on those terms and come up with decent explanations to them.*

This level of assignment encourages lower order thinking according to Blooms Taxonomy (Anderson et al., 2001; Churches, 2009) because it addressed reading, understanding, remembering, and explaining.

### Presentation

*At the completion of the search, there is a new understanding which informs learning, sharing and communicating with others.*

Reading and summarizing the allotted chapters gave students room to learn, share and communicate with their peers, albeit, at a lower order thinking level as occasioned by the type and level of assignment.

### Assessment

*A positive and conclusive information search gives a sense of accomplishment and increases self-awareness while it is contrary for an information search that is not conclusive.*

At the end of the assignment, students expressed some relief, self-confidence, sense of accomplishment, and satisfaction. This aspect agrees with the findings of Kuhlthau (1996, 2004, 2008, 2012) because of the feeling of self-accomplishment, but not necessarily increased self-awareness.

*S7 (Group A): I felt a bit confused and worried, that lasted till yesterday. I feel better now that I am done. At least I can rest easy now.*

*S44 (Group D): Actually fully satisfied, all work completed.*

*S59 (Group E) we are satisfied with the work and also confident in our work, to cap it all, we really did a great job. Thanks to all those that really helped to make the compilation easy for us!*

Some students expressed gratitude for the opportunity to interact with the researcher who provided them with some helpful tips.

The journaling also provided a rare opportunity to both students and lecturers alike to interact during the assignments. Students were able to chat freely with their lecturer on social media for the first time. The experience set a pace and standard for all parties involved especially the lecturers and the students. They told the researcher that the journaling afforded them a glimpse into the challenges that students face in the process of writing their assignments, especially in the case of group assignments when they need to meet, discuss, brainstorm, and garner their thoughts in order to fulfil the purpose of the assignment.

Students equally expressed their joy! Due to the short period of assignment writing, during which they had other competing assignments and lectures, the journaling on the WhatsApp platform gave them the opportunity to discuss what they would have otherwise done face to face even at the inconvenience of meeting.

## DISCUSSION

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The analysis of the journals confirms the extent to which Kuhlthau's ISP model is applicable in the students' course of conducting their assignments.

A major challenge faced in the research is that students had a number of short term assignments, with a time frame from three days to about two weeks. A total number of 77 students took part in the dialogue journaling; divided into seven groups, each group opened a WhatsApp platform. The lecturer and researcher were present on all platforms. Though not all the students had phones compatible with WhatsApp Messenger, the lecturer advised that they make their comments through their group members. Hence, the platforms were a bit rowdy because it appeared as though it was primarily set up for students to discuss and work out their assignments, rather than interact with the researcher on their day-to-day experiences with the group assignment. Most group members did not have the opportunity to meet as a result of time constraints, coupled with the fact that they were having lectures and other assignments to attend to.

Students were in seven groups: The researcher is of the view that the short time span and the later submission date given during the course of the assignment must have affected the pacing and the quality of the assignment. If the assignment was well planned and scaffolded in a way that students are guided to do certain tasks, for example, reading the prescribed textbook, taking notes, scouring for information from other sources, writing, etc., it would have helped in no small measure to keenly observe the information seeking process in line with Kuhlthau's model.

Not scaffolding or planning the assignment in order to enable students to tackle specific parts and portions of the assignments at specific timelines under supervision implies that students may not necessarily follow a research or enquiry process as they go through their assignment, or this may invite plagiarism. However, Kuhlthau's model, which forms the basis of this discussion, shows that information seeking is a process of knowledge construction with different cognitive and affective stages (George et al., 2006; Kahlal, 2011; Kuhlthau, 1993, 2004, 2008, 2012; Orlu, 2016; Serola & Vakkari, 2005; Wang & Soergel, 1998; Yang, 1997).

During the period of interaction with the class on WhatsApp, a common phrase among the students was "compile the assignment" which appeared as though some individuals had put some information together within such a short time. For a research assignment that needs to be reported with the various parts of a typical report, it is questionable to have completed this report within such a time frame while, other lectures and assignments were still on. The same students also had a Thermodynamics and Phase Behaviour (PNG 313) assignment which was due the same week and the Entrepreneurship course group assignment, among others.

Despite the shortcomings in the assignment question and its poor mode of administration which did not involve planning and scaffolding, students showed certain cognitive abilities, and they engaged in some physical actions during the course of their assignment.

### ***IMPLICATIONS OF RESEARCH FOR THEORY***

Kuhlthau ISP model is the primary model used as a lens to examine how students search and use information in their academic tasks. The model could not be applied in its entirety to the study's particular context of teaching and learning because in the nature of the assignments, elements of a guided approach to learning, under which Kuhlthau's ISP may be employed, are missing. Hence the information seeking process of undergraduates could not be ascertained; students were served the information to they used for the assignment which was not significantly challenging.

Alternative theory, such as Theory of Change (Quality Education in Developing Countries [QEDC], 2008) could explain the poor quality of education and the type of intervention that would enhance students' learning. For quality assurance in teaching and learning, Quality Education in Developing Countries strategies and QEDC theory of change under the Hewlett Foundation's Global Develop-

ment Program (HFGDP) affirm that (1) if more attention to and accountability for student learning exist in a country, (2) if governments and educators have knowledge about effective instructional models that can be scaled, and (3) if the necessary resources are in place to ensure student learning, policy and practice within the system (from donor practice to teacher behaviour) will change to produce improved student learning (QEDC, 2008, p. 11).

This theory will serve as invaluable at the point of evaluation and genuine intervention in teaching and learning.

### ***IMPLICATIONS OF RESEARCH FOR PRACTICE***

*Policy changes:* The research reveals that students are faced with too many assignments that appear counterproductive. It appears assignments are given randomly without coordination from the Academic Planning Unit (APU), faculty, and department. To address this problem, the APU should set a benchmark for all faculties and, by extension, the departments. Such benchmarks should form part of the discourse during Faculty Board Meetings (FBMs) that are held before the commencement of every semester, where the general academic welfare of the students and strategic planning for the implementation of the curriculum are discussed. Such meetings should bring on board the type/scope and number of assignments including learning outcomes.

### **CONCLUDING REMARKS**

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The students worked on a group assignment. They were 7 groups of 11 students per group making a total of 77 students. Each group was assigned sections in the textbook titled “Basic Petroleum Geology” by Peter Links to read, summarise, and present in the format of a research report. But they were also asked to source for more materials with similar subject matter.

First of all, having up to 11 students in a group is a much too large for a group assignment. This negatively impacted on their assignment writing as it was obvious in the interactions of the students during the journaling that the work was shared among a few members and compiled by the group leaders while some students did not even engage in the group work at all. This reveals a trivialization of the pedagogy of group work which is often overlooked in the process of teaching (Sutton, Zamora, & Best, 2005).

The students were required to read and summarise a portion of a textbook and also source for other materials with similar a subject and context. Therefore, the assignment did not give room for knowledge application, analysis, and evaluation, not to mention design and construction, something that should be seriously considered since they were engineering students; though the aim might have been for students to read before the class meeting. However, the assignment type simply narrowed their information seeking process. There was no research problem to investigate; no scaffolding that would have guided them to carry out tasks in specific parts. Therefore, it was a challenge to keenly observe their information seeking process in line with Kuhlthau’s model either face-to-face or in the journals. It is in the process of investigating a problem that Kuhlthau ISP model (Kuhlthau, 2004, p. 82) can be more readily utilised as a lens to study and understand students’ information seeking process.

The apparent level of uncertainty, optimism and confusion/doubt common in the initiation, selection, and exploration phases (Kuhlthau, 2004, 2008, 2012) of the ISP model respectively and low confidence levels were not markedly evident as students were “spoon fed” with the basic information needed. Perhaps, the assignment writing might have impacted them differently if they were given the same themes without a prescribed textbook to work with; although they were also encouraged to seek more information online. Some students did not source for additional information resources but only used the book prescribed as observed during one-on-one chat with S6, S33, S45, and S61.

From the analysis of the WhatsApp journals with the 300 level students of Petroleum Engineering Department on PNG 315 assignment, it was clear that they did not necessarily experience Kuhlthau’s

ISP because the assignment was not an investigation or an exploration of a problem which is a process of enquiry. An assignment that requires investigating a problem would have adequately revealed students' experience in terms of the physical, cognitive, and affective domains captured in ISP model. On the other hand, the mode of administration of the assignment may suggest that there is a challenge with teaching and learning which may hinge on the curriculum and the way it is delivered.

The ability to use emerging technologies is a form of literacy that is required by the 21<sup>st</sup> century work place. Hence, the study demonstrates students' adaptation to emerging technology; however, the ability to critically examine information and use it ethically is crucial to the progress and developing society that is inundated with myriads of information.

The study was limited to only one case site. It would be more helpful to the Nigerian society to have this study extended to other universities for the purpose of generalisation and appropriate intervention.

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## Making Sense of Information Seeking Process

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