



Pergamon

Internet and Higher Education
5 (2002) 157–166

**THE INTERNET
AND HIGHER
EDUCATION**

A virtual student Not an ordinary Joe

Frederick B. King*

*Education, Nursing, and Health Professions, University of Hartford,
200 Bloomfield Avenue, West Hartford, CT 06117-1599, USA*

Received 8 February 2002; accepted 12 March 2002

Abstract

Some researchers and educators contend that distance education is the new, student-centered paradigm for future learning and one of the fastest growing areas in education. Despite its continued growth and popularity, distance education suffers from a number of problems. One of the most troubling is a much higher course “dropout” rate in online courses compared to traditional campus-based education. There are a number of factors that contribute to course noncompletion in Web-based distance education: feelings of isolation, frustrations with the technology, anxiety, and confusion. This article provides a discussion on certain tools used by the author to mitigate these negative factors, such as the use of electronic office hours. Explored in depth, however, is a tool that the author has had the most success using in reducing some of the chronic problems that seem to assail students taking online courses. This same tool promotes learner interaction and collaborative learning at a distance. This “magical” tool the author has created for his online classes is a fictitious virtual student who is “not an ordinary Joe.” © 2002 Elsevier Science Inc. All rights reserved.

Keywords: Asynchronous distance education; Distance education courses; Asynchronous learning; Online learning; Virtual student; Collaborative learning; Community of learners; Facilitator; Virtual office hours; Agents; Intelligent agents

* Tel.: +1-860-768-5190; fax: +1-860-768-5197.

E-mail address: rking@mail.hartford.edu (F.B. King).

1. Introduction

Over the past decade, there has been a sustained increase in and a need for courses taught at a distance. Shotsberger (2000) reported that though it took radio 38 years to reach 50 million users and TV took 30 years, the World Wide Web hit that usage mark in a mere 4 years. The U.S. Department of Education reported in 1998 that 75% of 12–17-year-olds in the United States were online. The National Center for Education Statistics (NCES) also reported that an estimated 25,730 courses were offered through distance education. Of these courses, 45% were offered by public 4-year colleges and universities, private 4-year institutions offered 16%, and 2-year colleges offered the remaining 39%. These institutions offered approximately 700 degrees and 170 certificates that could be completed by taking distance education courses exclusively (NCES, 1998). That was determined in academic year 1994–1995, and represented 33% of higher educational institutions and over 750,000 students. Palloff and Pratt (2001) reported a December 1999 NCES study that indicated “between the Fall of 1995 and 1997–98 the percentage of all higher education institutions offering distance education courses increased by about one-third and that the number of course offerings and enrollments in distance education courses doubled” (p. 4).

Not only are higher education institutions expanding their use of distance education geometrically, but business and industry have also entered the distance education field. Distance education courses and programs can now be found in all of the 50 states and U.S. territories (Barker & Dickson, 1996). Miller (1997) wrote that a 1995 survey in the United States showed that 62% of middle-aged workers employ computers in their work, and in an additional survey, 46% of the people interviewed listed the computer as essential technology. Computers and online distance education appear to offer unrealized possibilities for lifelong learning in a country where corporations are investing more than \$80 billion each year on education and training (Miller, 1997).

Despite its continued growth and popularity, distance education suffers from a number of problems. One of the most troubling is a much higher course “dropout” rate in online courses compared to traditional campus-based education. There are a number of factors that contribute to course noncompletion in web-based distance education: feelings of isolation, frustrations with the technology, anxiety, and confusion. This article provides a discussion of certain tools used by the author to mitigate these negative factors, such as the use of electronic office hours. Explored in depth, however, is a tool that the author has had the most success using in reducing some of the chronic problems that seem to assail online courses. This same tool promotes learner interaction and collaborative learning at a distance. This “magical” tool the author has created for his online classes is a fictitious virtual student who is “not an ordinary Joe.”

1.1. Asynchronous online education

In this article, the author focuses on asynchronous online education, also commonly referred to as web-based instruction (WBI) (Kearsley, 2000; King, Young, Drivere-Richmond, & Schrader, 2001; Moore, 1987). In using WBI, there is no required, direct,

synchronous (time or geographically sensitive) interaction between the students and the instructor during normal day-to-day activities (Barker & Dickson, 1996). Communication is available, mainly through e-mail, and asynchronous discussions on electronic bulletin boards, listservs, etc. This is not to say that there are not synchronous aspects to an asynchronous course. In fact, Danchak (2000) contends that successful online courses are a blend of asynchronous and synchronous events: about 80% asynchronous and 20% synchronous. For example, some instructors, like myself, meet with their class for the first class period to discuss the technologies to be used and for practice using those technologies. The remainder of the class is conducted online, asynchronously. Even then, I employ the synchronous chat capabilities of the application software on a weekly basis, but more about this later.

1.2. Benefits of asynchronous courses

There are a multitude of benefits associated with web-based asynchronous courses. A major reason students enroll in courses offered at a distance is the personal convenience such courses affords (Hiltz, 1997; NCES, 1998; Thompson, 1998). Taking an online course means that participation is “anytime/anywhere.” This means that “class time” can be more readily adapted to the student’s busy schedule and still allow the learner to be a part of a community of learners (Bourne, McMaster, Rieger, & Campbell, 1997; Carr-Chellman, Dyer, & Breman, 2000; Hiltz, 1997). Additionally, asynchronous distance education allows students to have more time to be reflective in their thinking before having to answer a question or participate in an online discussion (Bonk, Malikowski, Angeli, & East, 1998; Hiltz, 1997). Kaye (1991) wrote that a cumulative record of messages and the tools for retrieving and organizing these messages provided a greater potential for reflective and thoughtful analysis, hence for collaboration and knowledge building, than in a face-to-face classroom. Some students report having more “quality” time with the professor than they have experienced in the traditional face-to-face classroom (Kroder, Suess, & Sachs, 1998).

1.3. Some problems with asynchrony

There are also problems specific to online, asynchronous courses. One of the biggest problems that have been identified is the low completion/high dropout rate encountered in classes offered at a distance (Hiltz, 1997). Moore and Kearsley (1996) reported “In the past it was not unusual for noncompletion (also referred to as ‘dropout’) rates for distance learning courses to be in the range of 30 to 50 percent; nowadays the figure should be near the lower end of that range” (p. 159). Even if the figure is at the lower end of that range that means that one-third of the students enrolling in courses taken through distance education do not complete the course. This amounts to an unacceptable problem of hundreds of thousands of students not completing courses.

There are a number of factors that contribute to course noncompletion in distance education: lack of feedback, feelings of isolation, frustrations with the technology, anxiety, and confusion. Lack of timely feedback is a continual problem in distance education

courses (Hara & Kling, 2000). For successful online courses, instructors need to engage in frequent entry and postings in the manner of public or private and positive and negative feedback in discussion areas (Bonk & Cummings, 1998; Kimball, 1995; Kroder et al., 1998). Though some researchers found students' feelings of isolation to be a major concern in distance education courses, Hara and Kling (2000) did not find it to be a major problem. This has changed because of advances in communications technology. Computer-mediated communication was found to be a significant technology in overcoming learners' feelings of isolation (Carr-Chellman et al., 2000). Frustrations with technology such as slow connections, incompatible browser/software interfaces, servers going down suddenly, etc., will continue to be a problem with online courses for the foreseeable future. However, research indicates that social more than technical factors are the main determinants of success or failure in a computer-mediated course (Kaye, 1991). However, as mentioned later in this article, technical frustrations also served to bond a group of students. Anxiety is generally manifested in first-time distance education students and dissipates as the course progresses. Confusion can generally be alleviated by better course design and more explicit written instructions.

2. Addressing the problems through course design

Is there a better course design and pedagogy and a trick or two to employ in online asynchronous distance education courses? The literature tells us that there is a better pedagogy for online courses, one that has proved very successful in conducting courses at a distance. That pedagogy is the use of collaborative learning to build online communities of learners (Carr-Chellman et al., 2000; Hiltz & Benbunan-Fich, 1997; Wegerif, 1998). Bourne et al. (1997) state that the key ingredient for success in distance education courses is for the learner to become a part of a collaborative community of learners.

Jonassen, Davidson, Collins, Campbell, and Haag (1995) believe that collaboration is the focus of constructivist distance learning activities. Collaborative learning stresses active participation and interaction among/between students and instructors (Hiltz, 1997). As Wegerif (1998) reports, "individual success or failure on the course depended upon the extent to which students were able to cross a threshold from feeling like outsiders to feeling like insiders" (p. 34). Jonassen et al. (1995) contend "we believe that the most valuable activity in a classroom of any kind is the opportunity for students to work and interact together and to build and become a part of a community of scholars and practitioners" (p. 7). It is the interaction of students and instructors and the way that these interactions take place that allow the participants to move from a position of legitimate peripheral participant (Lave & Wenger, 1991) to a full and central status within the community of learners. The collaborative learning model stresses the importance of the instructor being a "guide on the side" or a "mentor in the center." In this capacity, the instructor not only guides the other learners, but is also a full, cooperative, and collaborative learner within the established community of learners (Brown & Campione, 1990; Collison, Elbaum, Haavind, & Tinker, 2000).

2.1. *Helping establish a collaborative community of learners—meet Joe Bag O’Donuts*

How does one establish a community of learners that is fully collaborative in an online course? Once established, how does an instructor nourish and grow the community of learners? One technique that I have used, and have had great success with, is enrolling an “extra” student into my courses. This student, whose name is Joe Bag O’Donuts (Joe or Joe Bags for short), is a fictitious virtual student. Joe is my right-hand person when it comes to my courses, both online courses and web-enhanced courses. Joe, as all my students are informed, will join in all discussions and participate with all project teams. He will enter into all dialogues, but I warn them not to take everything Joe says as the truth, for like everyone, he makes mistakes. Let me explain further how Joe contributes to my online classes.

2.2. *Anthropomorphizing a virtual student*

Reeves and Nass (1996) wrote that people are prone to treat computers, television, and other technologies like real people and places. This type of perception is anthropomorphic in nature. The author has found that this is true with virtual students as well. Even though the students in my classes know that Joe Bags is a fictitious student, they respond to him as if he were a real student.

“Joe” is a full participating member of the class. This begins with the class photos. All of my classes have a photograph page on the course website. (This picture page is particularly important in the asynchronous online courses. It helps learners identify other members of the class, especially their project team members.) Joe’s picture is on the photo page in proper alphabetical order. Joe appears as a college-age student, baseball cap on backwards, wearing dark sunglasses, and reading a book entitled *HTML for Dummies*. The book covers most of his face except for his nose and higher.

2.3. *Joe starts the discussion/collaboration*

One of the first and continuing tasks that Joe undertakes is to gather information to pass on to his fellow classmates. He will sometimes check out my notes and pass the important points on to the other students. He will do this by posting messages to the discussion board that give hints as to what the professor deems important. In this way, Joe Bags gives the students the objectives for each chapter and major points that the instructor deems important. I have also found that using Joe in this “ice-breaking” mode right at the start of the dialogue relieves some of the students’ early anxiety with this form of communication and interaction.

2.4. *Joe is a facilitator*

If the most fundamental software requirement for support of an online, collaboratively conducted course is a good conference structure (Hiltz & Benbunan-Fich, 1997), then the key process to this successful online course is discussion facilitation (Collison et al., 2000; Kaye, 1991). The presence of Joe provided all of my classes with two facilitators. Each of us, Joe

and I, then supported collaborative learning and the social construction of learning environment. Wegerif (1998) indicates “Unstructured collaborative learning began with students sharing any difficulties that they were having in getting online and continued through all stages of the course” (p. 36). Wegerif also contends, “Forming a sense of community, where people feel they will be treated sympathetically by their fellow, seems to be a necessary first step for collaborative learning” (p. 48). Accordingly, I have used Joe to get the discussion started and to get him involved with the other students as an equal member of the class, thereby forming a sense of community as early as possible.

Joe Bag O’Donuts is generally the first student to make a posting to the “Technical Problems” discussion area. “Can’t believe it took me so long to log onto the WebBoard[®]. I think that the problem rests with my browser. When I switched browsers from **** to **** my problems disappeared. Are any of you having similar problems?” Joe’s question usually starts the dialogue. Joe will answer some of the questions/responses from classmates based on “his experience,” and some he will “forward” to me for an answer. In this way, Joe helps bring both of us into active participation in the learning and knowledge-building process (Scardamalia & Bereiter, 1994) in an unobtrusive and natural manner. I am also able to make a mistake (intentional or not) and, if the other students do not correct it, the model is used of “correcting the participant/professor” process with Joe.

Joe plays learner and facilitator in all of the whole class discussions and individual project team discussions. Collison et al. (2000) present six voices that a “guide on the side” can use to facilitate online dialogue: generative guide, conceptual facilitator, reflective guide, personal muse, mediator, and role player. Though Joe Bags could use any of these six voices, I have limited him to generative guide, reflective guide, personal muse, and mediator. In these various voices, he uses an informal conversation style that has been found to be most effective with online courses. Additionally, he targets his comments directly to students or specific statements, a technique that has also proved successful in fostering peer-to-peer interaction (Bonk et al., 1998). I also use Joe in other ways to stimulate peer-to-peer interaction. For example, sometimes when I pose a question, Joe will answer that question incorrectly and then he will ask if the other students understand the question and answer the same way he did. Hopefully, the other students will correct his misunderstandings before I correct them. (It is my technique, in promoting this critical dialogue, to allow student mistakes and errors stand for at least 48 hours before I, as instructor, correct them.)

2.5. Joe is a useful model and subject

I have also used Joe Bags to model a collegial, research-based, collaborative conversation. For instance, on occasion he has disagreed with the instructor and used literature references to back up and introduce his point of view (another well-known theory). Joe and I try not to dominate the discussions and start to withdraw from the conversations as the other learners participate between themselves with greater frequency and depth (Regalbutto, 2000). Though we have not hit the lower end of 15–20% of instructor contributions to message volume that Jonassen et al. (1995) refer to, we are close.

Joe Bags has also been the subject/fall guy for some of our discussions. In a graduate level, educational psychology theories course, I introduced the fact that Joe was a pack-and-a-half-a-day cigarette smoker. I then asked the students which of the theories of learning they might use to try to break Joe of his smoking habit. The discussion that ensued was lively and emphasized the behavioristic methods of breaking habits. Joe, however, was a little miffed. “I can’t believe that I go away for a long weekend and all of you pick on me while I’m gone!” One student wrote back “Joe, we weren’t picking on you, we were just trying to find the best way to help you break the smoking habit. We don’t want you to get lung cancer.” Joe was definitely a member of this learning community.

2.6. Virtual office hours

A regular part of my online courses are electronic office hours. I set aside 90 minutes each week to conduct office hours. Normally, the time the office hours are held is between 8:00 and 9:30 p.m. to best accommodate those students with young children. Office hours are held as an online, synchronous chat. (Sometimes it is nice to have a beverage of choice to sip while chatting.) It is not mandatory for students to attend office hours because that would detract from the convenience associated with asynchronous, online courses. There is research that supports this use of a mix of synchronous discourse in asynchronous courses (Danchak, 2000; Shotsberger, 2000). Although not regarded as necessary for adult learner success, the online chats serve to help by providing: just-in-time support for questions, technical problems; elucidation of assignments; and community building through real time communication (Shotsberger, 2000). At the end of office hours, I download the conversation into a word processing program and edit out all of the extraneous conversation (such as hellos, good-byes, etc.) and then e-mail the chat transcript to all students in the class, even those who did not attend the office hours. I found that mailing these transcripts furthers the building of community by demonstrating that we are all in it together.

Joe is a regular participant in these office hours. I accomplish this through the use of two browsers, one of which I use and the other Joe uses. I will sometimes wait to have Joe log-on to determine if the students want him in the conversation. There has not been one time when Joe is late logging on that I have not been asked “Is Joe joining us tonight?” or “Where’s Joe?” Also, using Joe diminishes the perceived amount of one-way, instructor-dominated communication that sometimes takes place in synchronous chats (Shotsberger, 2000).

3. Final thoughts

The creation and use of a virtual student for all of my online and web-enhanced courses has proved very beneficial. I have found that students participate in online discussions earlier and more frequently. I have also found that those students that might be reticent to address a posting to the instructor do not hesitate to address their issues/questions to Joe Bags. In fact, Joe receives more communications in the early stages of my courses than I receive. I believe, though I do not have any empirical information to back it up, that the addition of Joe has

made my courses more interesting, more collaborative, and more motivating. I do know that I had two students drop out of my distance education course the first time I employed a virtual student. However, both of these students enrolled in that same course the following semester. Presently, the completion rate for all of my distance education courses is 100%. (This statistic should be tempered by the fact that these asynchronous distance education courses are all at the graduate level.)

One student wrote, in their end of course critique, that Joe made the course more interesting and more fun. I was very glad to see that, because Joe has made the classes a lot of fun for me. Aside from having more fun with the courses, another benefit of using my virtual student, Joe Bags, is that this technique keeps me challenged and engaged. I approach each log-on from two viewpoints that enable me to facilitate and collaborate from multiple perspectives (Collison et al., 2000). It does, of course, entail a little more work and research on my part. But, then, that is what being a member of a community of learners is all about.

Mr. Joe Bag O'Donuts has definitely become an integral and active member of every online course that I have taught. If the human touch of teaching is the role of attentiveness in motivating students (Regalbuto, 2000), then Joe Bag O'Donuts has been an invaluable aid to me in my online courses.

4. Future directions

There is still research to be done on the use of such tools as Joe Bag O'Donuts. How did the students really perceive this fictitious student? Did Joe really enhance the students' online educational experience? Are there things that I could do with Joe to further improve my web-based courses?

Presently, Joe Bags takes a lot of time and energy. Though the effort is worthwhile, are there ways of making Joe more autonomous and less demanding of my time and resources? One promising area of technology that may help alleviate some of the more tedious aspects of using a fictitious virtual student, while improving online education, is intelligent agent technology. Users of Microsoft Office products will recognize a basic form of this technology in the "Office Assistant" function. Microsoft, and numerous other companies, has fielded intelligent agent technology that can be used by individuals on their websites (*Microsoft Agent*, n.d.). Festa's (1999) observation that intelligent agent technology was making a comeback has proven to be accurate. Isbister and Layton (n.d.) state that intelligent agent technology is being developed at Xerox, PARC, MIT's Media Lab, and by researchers at other companies and universities. Isbister and Layton list three pages of websites and references for this developing technology.

Today these agents are used in a variety of ways: they can filter e-mail for an individual, independently comb the web for the best price on goods, help protect a person's privacy, and other provide other good works. This agent technology could greatly benefit asynchronous online courses. Intelligent agents could perform a multitude of tasks, such as personalizing online conversations. This would make the course more interesting and motivating, as well as autonomously perform mundane tasks that consume the professors'

and students' time. Intelligent agent technology appears to be a very promising area of research for web-based education. It seems that Joe Bag O'Donuts may have a family in the future.

References

- Barker, B. O., & Dickson, M. W. (1996). Distance learning technologies in K-12 schools: past, present and future practice. *Tech Trends*, 41(6), 19–22.
- Bonk, C. J., & Cummings, J. A. (1998). A dozen recommendations for placing the student at the centre of web-based learning. *Educational Media International*, 82–89.
- Bonk, C. J., Malikowski, S., Angeli, C., & East, J. (1998). Web-based case conferencing for preservice teacher education: electronic discourse from the field. *Journal of Educational Computing Research*, 19(3), 269–306.
- Bourne, J. R., McMaster, E., Rieger, J., & Campbell, J. O. (1997). Paradigms for on-line learning: a case study in the design and implementation of an Asynchronous learning networks (ALN) course. *Journal of Asynchronous Learning Networks*, 1(2), 39–56.
- Brown, A. L., & Campione, J. C. (1990). Communities of learning and thinking, or a context by any other name. In D. Kuhn (Ed.), *Contribution to human development: Vol. 21. Developmental perspectives on teaching and learning thinking skills* (pp. 108–126). Basel: Karger.
- Carr-Chellman, A., Dyer, D., & Breman, J. (2000). Borrowing through the network wires: does distance detract from collaborative authentic learning? *Journal of Distance Education*, 15(1). Available at: <http://cade.athabasca.ca/vol15.1/carr.html>. Accessed October 5, 2001.
- Collison, G., Elbaum, B., Haavind, S., & Tinker, R. (2000). *Facilitating online learning: effective strategies for moderators*. Madison, WI: Atwood.
- Danchak, M. M. (2000, December). *Giving web-based courses an active human face*. Presentation for the Institute for Teaching and Learning, University of Connecticut, Storrs, CT.
- Festa, P. (1999). "Intelligent agent" technology staging a comeback. *Tech News-CNET.com*. Available at: <http://news.com.com/2100-1023-232110.html>.
- Hara, N., & Kling, R. (2000). *Students' distress with a web-based distance education course*. Indiana University, The Center for Social Informatics. Available at: <http://www.slis.indiana.edu/CSI/wp00-01.html>. Accessed February 16, 2000.
- Hiltz, S. R. (1997). Impacts of college-level courses via asynchronous learning networks: some preliminary results. *Journal of Asynchronous Learning Networks*, 1(2), 1–19.
- Hiltz, S. R., & Benbunan-Fich, R. (1997, April). *Supporting collaborative learning in asynchronous learning networks*. Invited keynote address for the UNESCO/Open University Symposium on Virtual Learning Environments and the Role of the Teacher, Milton Keynes, England. Available at: <http://eies.njit.edu/~hiltz?CRProject/unesco/htm>. Accessed February 23, 1999.
- Isbister, K., & Layton, T. (n.d.). *Intelligent agents: a review of current literature*. Available at: <http://research.microsoft.com/research/ui/persona/Isbister.htm>. Accessed March 7, 2002.
- Jonassen, D., Davidson, M., Collins, M., Campbell, J., & Haag, B. B. (1995). Constructivism and computer-mediated communication in distance education. *American Journal of Distance Education*, 9(2), 7–26.
- Kaye, A. R. (1991). Learning together apart. In A. R. Kaye (Ed.), *Collaborative learning through computer conferencing: the Najaden papers: Vol. F 90. NATO Science Committee, NATO Special Programme on Advanced Educational Technology* (pp. 1–24). Berlin: Springer-Verlag.
- Kearsley, G. (2000). *Online education: learning and teaching in cyberspace*. Toronto: Wadsworth.
- Kimball, L. (1995, October). Ten ways to make online learning groups work. *Educational Leadership*, 54–56.
- King, F. B., Young, M. F., Drivere-Richmond, K., & Schrader, P. G. (2001). Defining distance learning and distance education. *Educational Technology Review*, 9(1). Available at: <http://www.aace.org/pubs/etr/king2.cfm>. Accessed November 16, 2001.
- Kroder, S. L., Suess, J., & Sachs, D. (1998). Lessons in launching web-based graduate courses. *Technological*

- Horizons in Education Journal* 10 (25). Available at: <http://web.lexis-nexis.com/universe>. Accessed February 24, 1999.
- Lave, J., & Wenger, E. (1991). *Situated learning: legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.
- Microsoft (n.d.). *Microsoft Agent Version 2.0*. Available at: <http://www.microsoft.com/msagent/>. Accessed March 6, 2002.
- Miller, G. E. (1997). Distance education and the emerging learning environment. *Journal of Academic Librarianship*, 23(4), 319–321.
- Moore, M. B. (1987). University distance education of adults. *Tech Trends*, 32(4), 13–18.
- Moore, M.G, & Kearsley, G. (1996). *Distance education*. San Francisco: Wadsworth.
- National Center for Educational Statistics (1998). *Distance education in higher education institutions*. National Center for Education Statistics. Available at: <http://nces.ed.gov/pubs98/distance/index.html>. Accessed November 5, 2001.
- Palloff, R. M., & Pratt, K. (2001). *Lessons for the cyberspace classroom: the realities of online teaching*. San Francisco: Jossey-Bass.
- Reeves, B., & Nass, C. (1996). *The media equation*. Cambridge, UK: Cambridge University Press.
- Regalbuto, J. (2000). *Teaching at an Internet distance*. Teaching and Learning, The Report of a 1998–1999 University of Illinois Faculty Seminar. Available at: http://www.vpaa.uillinois.edu/tid/report/tid_report.htm. Accessed July 26, 2000.
- Scardamalia, M., & Bereiter, C. (1994). Computer support for knowledge-building communities. *Journal of the Learning Sciences*, 3(3), 265–283.
- Shotsberger, P. G. (2000). The human touch: synchronous communication in web-base learning. *Educational Technology*, 40(1), 53–56.
- Thompson, M. M. (1998). Distance learners in higher education. In C. C. Gibson (Ed.), *Distance learners in higher education: institutional responses for quality outcomes* (pp. 9–24). Madison, WI: Atwood.
- Wegerif, R. (1998). The social dimension of asynchronous learning networks. *Journal of Asynchronous Learning Networks*, 2(1), 34–49.